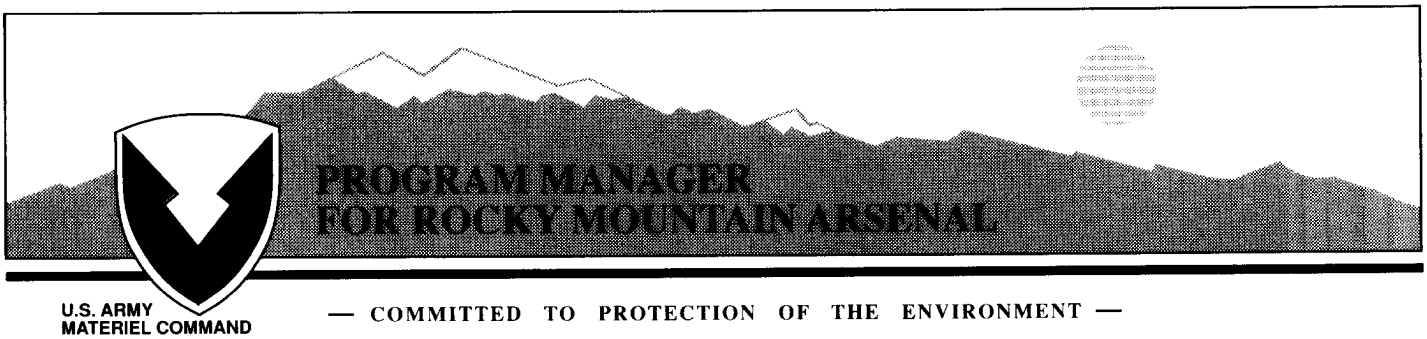

U.S. ARMY
MATERIEL COMMAND

— COMMITTED TO PROTECTION OF THE ENVIRONMENT —

FINAL

Chemical Process-Related Activities

Nonagent Process Equipment and Piping Planning Task

Consolidated Implementation Document
Version 3.1

January 1995
Contract Number DAAA05-92-D-0004

JACOBS ENGINEERING GROUP INC.

RIEDEL ENVIRONMENTAL SERVICES, INC.
GERAGHTY & MILLER, INC.

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FOR ROCKY MOUNTAIN ARSENAL
AMXRM-PM COMMERCE CITY, CO 80022

TECHNICAL SUPPORT FOR ROCKY MOUNTAIN ARSENAL

FINAL

Chemical Process-Related Activities

Nonagent Process Equipment and Piping Planning Task

Consolidated Implementation Document Version 3.1

January 1995
Contract Number DAAA05-92-D-0004

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THIS CONSOLIDATED DOCUMENT IS ORGANIZED AS FOLLOWS: SECTION 1.0 DISCUSSES THE OBJECTIVES, SCOPE, AND PROGRAM HISTORY OF THIS DOCUMENT. SECTION 2.0 DISCUSSES THE COORDINATION REQUIREMENTS FOR THE CONSOLIDATED IRA PROGRAMS. SECTION 3.0 IS A SYNOPSIS OF THE CONTAMINATION ASSESSMENT FOR PIPING, EQUIPMENT, TANKS, ELECTRICAL CODUIT, AND STRUCTURES FOR DISMANTLEMENT, REMOVAL, AND DECONTAMINATION. SECTION 4.0 PROVIDES SAMPLING AND ANALYSIS REQUIREMENTS FOR THE DEMOLITION AND DISPOSAL ACTIONS. SECTION 5.0 DETAILS THE DECONTAMINATION PROCEDURES FOR SALVAGEABLE PIPING AND EQUIPMENT. SECTION 6.0 PROVIDES BASIC INFORMATION AND PRELIMINARY ASSESSMENT OF THE DEMOLITION OPERATION FOR TANK, CONDUIT, AND EQUIPMENT REMOVAL. SECTION 7.0 ADDRESSES PIPING AND EQUIPMENT SALVAGE, AS WELL AS WASTE MANAGEMENT. SECTION 8.0 AND 9.0 PRESENTS THE HEALTH AND SAFETY ISSUES AND EMERGENCY SPILL RESPONSE AND CONTINGENCY PLANNING NECESSARY TO MINIMIZE THE POTENTIAL OF AN ACCIDENT OR INCIDENT. SECTION 10.0 DISCUSSES THE INTEGRATED AND DEMOLITION PLANNING. SECTION 11.0 PROVIDES A COST

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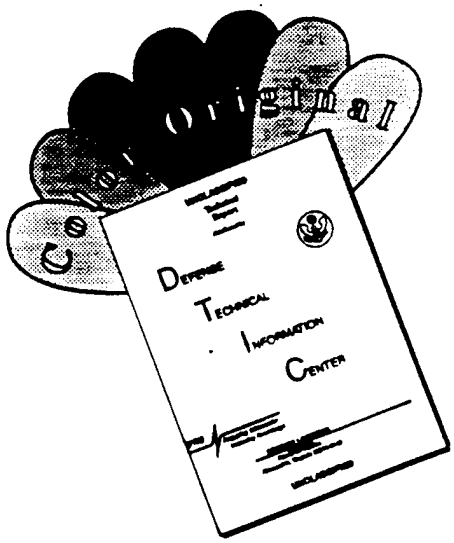

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ABBREVIATIONS AND ACRONYMS

ACM	asbestos-containing material
ARAR	applicable or relevant and appropriate requirement
Army	U.S. Department of the Army
AST	aboveground storage tank
ATSDR	Agency for Toxic Substances and Disease Registry
BDAT	best demonstrated available technology
CDPHE	Colorado Department of Public Health and Environment
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CLP	Contract Laboratory Program
cm	centimeters
cm^2	square centimeters
COR	Contracting Officer's Representative
CPR	cardiopulmonary resuscitation
CPRA	chemical process-related activities
CWHA	Central Waste Handling Area
CWWTF	CERCLA Wastewater Treatment Facility
DET	Denver Effluent Treatment
DMC	Data Management Coordinator
DOD	U.S. Department of Defense
DOE	U.S. Department of Energy
DOI	U.S. Department of Interior
DOT	U.S. Department of Transportation
DRMO	Defense Reutilization and Marketing Office
DSA	Development and Screening of Alternatives
EBASCO	EBASCO Environmental Services Inc.
EPA	U.S. Environmental Protection Agency
ESD	Explanation of Significant Differences
ESRCP	Emergency Spill Response and Contingency Plan
FFA	Federal Facility Agreement

LIST OF

ABBREVIATIONS AND ACRONYMS

GB	isopropyl methylphosphonofluoridate
Haz-Cat	Hazard Categorization
HAZWOPER	Hazardous Waste Operations and Emergency Response
HDPE	high-density polyethylene
HLA	Harding Lawson Associates
HNu	brand name of a portable photoionization detector
ICP	inductively coupled plasma
IRA	Interim Response Action
IRDMIS	Installation Restoration Data Management Information System
IRT	Installation Response Team
Jacobs	Jacobs Engineering Group Inc.
JSA	Job Site Analysis
LAB	laboratory
LDR	land disposal restriction
LEL	lower explosive limit
mm	millimeters
NSP	no suspect PCB equipment
O&M	operations and maintenance
OAS	Organizations and State
OSHA	Occupational Safety and Health Administration
OVA	organic vapor analyzer
PCB	polychlorinated biphenyl
PEL	permissible exposure limit
PMRMA	Program Manager for Rocky Mountain Arsenal
PPE	personal protective equipment
ppm	parts per million
PROD	production
PTI	pyrotechnic incendiary operations
QA	quality assurance
RCRA	Resource Conservation and Recovery Act
RMA	Rocky Mountain Arsenal
ROD	Record of Decision

LIST OF

ABBREVIATIONS AND ACRONYMS

Shell	Shell Oil Company
SOP	standard operating procedure
SPDA	South Plants Decontamination Area
TC	thionyl chloride
UL	Underwriters' Laboratory
UST	underground storage tank
Weston	Roy F. Weston Inc.
WMS	Waste Management Specialist
yd^3	cubic yards
$\mu g/L$	micrograms per liter
^oC	degrees Centigrade

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EXECUTIVE SUMMARY

The goal of this Consolidated Implementation Document is to provide an integrated approach to the removal of piping, equipment, tanks, and electrical conduit in the South Plants at the Rocky Mountain Arsenal and to salvage as much of this material as is practicable. The items identified for removal have three characteristics in common: (1) they are associated with the nonagent chemical processes in the South Plants; (2) they have not been previously identified for removal under any other program; and (3) they will only be removed if it is cost effective and safe, therefore minimizing waste.

The South Plants Chemical Process-Related Activities (CPRA) interim response actions (IRA) primary work elements that are addressed in this Consolidated Implementation Document consist of (1) removal of remaining nonagent equipment and piping in the South Plants structures; (2) removal of remaining external nonagent process piping; (3) removal of remaining aboveground and underground storage tanks; and (4) removal of associated electrical conduit. Responsibility for removal of materials as defined by the 1989 Settlement Agreement between the U.S. Government and Shell Oil Company and any subsequent agreements is in no way altered by this document.

This Consolidated Implementation Document contains the following information regarding the CPRA IRA work elements:

- the program background and history;
- coordination requirements for consolidated IRA programs;
- contamination assessment for items considered for removal;

- sampling and analysis requirements;
- decontamination procedures;
- a preliminary assessment of demolition operations;
- disposition of waste, equipment, and piping;
- health and safety issues;
- emergency spill response and contingency plan;
- integrated and demolition planning;
- Notification and Completion Letter requirements; and
- a cost estimate and schedule summary.

The information contained in this document was obtained from document surveys, historical records, several field investigations and sampling programs. Investigative information was gathered for 47 manufacturing processes, 50 underground storage tanks, 150 aboveground storage tanks, approximately 31 miles of process piping, approximately 30 miles of electrical conduit, 945 pieces of equipment, and 77 structures.

The estimated cost for work identified in this Consolidated Implementation Document is approximately $14 million. The work element components addressed in this implementation plan are expected to be completed by the calendar year 2000.

1.0 INTRODUCTION

The goal of this Consolidated Implementation Document is to provide an integrated approach to the removal of piping, equipment, tanks, and electrical conduit in the South Plants at the Rocky Mountain Arsenal and to salvage as much of this material as is practicable. The items identified for removal have three characteristics in common: (1) they are associated with the nonagent chemical processes in the South Plants; (2) they have not been previously identified for removal under any other program; and (3) they will only be removed if it is cost effective and safe, therefore minimizing waste.

The South Plants Chemical Process-Related Activities (CPRA) interim response actions (IRA) work elements that are addressed in this Consolidated Implementation Document include the following components:

- removal of remaining nonagent piping and equipment in the South Plants structures;

- removal of remaining external nonagent process piping;

- removal of underground storage tanks (USTs) and aboveground storage tanks (ASTs) not covered in EBASCO (1994a) or the Program Manager of Rocky Mountain Arsenal (PMRMA 1993) *Final Implementation Letter*;

- removal of electrical conduit that is co-located with items associated with those identified in this document for removal; and

- an inventory of equipment in Shell structures.

Not all equipment, piping, tanks, and conduit will be removed. For waste minimization, only material that can be removed cost-effectively and safely will be considered. Material will not be removed if (1) significant quantities of material can not be efficiently decontaminated and would have to be disposed of as hazardous waste and (2) materials are encountered that would be more cost-effectively removed as part of the building demolition phase. The responsibility for removal of materials as defined by the 1989 Settlement Agreement between the U.S. Government and Shell Oil Company and any subsequent agreement is in no way altered by this document.

The information presented in this Consolidated Implementation Document was obtained from document surveys, historical records, field investigations, and a sampling program. This document considers 47 manufacturing processes, 50 USTs, 150 ASTs, approximately 31 miles of process piping, approximately 30 miles of electrical conduit, 945 pieces of equipment, and 77 structures that were identified in the South Plants Area of the Rocky Mountain Arsenal.

This Consolidated Implementation Document is organized as follows:

- Section 1.0 discusses the objectives, scope, and program history of this document.

- Section 2.0 discusses the coordination requirements for the consolidated IRA programs.

- Section 3.0 is a synopsis of the contamination assessment for the piping, equipment, tanks, electrical conduit, and structures evaluated for dismantlement, removal, and decontamination.

- Section 4.0 provides sampling and analysis requirements for the demolition and disposal actions.

- Section 5.0 details the decontamination procedures for salvageable piping and equipment.

- Section 6.0 provides basic information and a preliminary assessment of the demolition operation for tank, conduit, and equipment removal.

- Section 7.0 addresses piping and equipment salvage, as well as waste management.

- Sections 8.0 and 9.0 present the health and safety issues and the emergency spill response and contingency planning necessary to minimize the potential of an accident or incident.

- Section 10.0 discusses the integrated and demolition planning.

- Section 11.0 provides a cost estimate and schedule summary for the decontamination and demolition.

- Section 12.0 provides a list of references used in the preparation of this document.

1.1 PROGRAM BACKGROUND

The Federal Facilities Agreement (FFA) is an agreement among the PMRMA (as part of the U.S. Department of Defense), Shell Oil Company, the U.S. Environmental Protection Agency, the U.S. Department of Interior, and the Agency for Toxic Substances and Disease Registry. The FFA allows for parties to establish a program to expedite the cleanup of Rocky Mountain Arsenal (RMA) and to institute a record of decision (ROD) to guide the final cleanup. Provisions are included in FFA to develop IRAs as part of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process leading to the issuance of the ROD. This Consolidated Implementation Document was prepared to meet the requirements of the FFA.

In 1991, the U.S. Department of the Army (Army) issued the Final Decision Document for the CPRA IRA (Tennessee Valley Authority [TVA] 1992). In that document, the Army proposed to decontaminate and remove equipment and piping used in the manufacturing of chemical warfare agents. In 1992, the Army expanded the scope of the IRA to include nonagent equipment and piping decontamination and removal in the Final Explanation of Significant Differences (ESD) (PMRMA 1992). In November 1993, the Army expanded the scope of the removal of nonagent equipment and piping in the South Plants work elements (Phase II) to include all items not addressed as part of an existing program. The document was titled the Consolidated Implementation Document to reflect this Phase II expansion.

The IRAs that are currently being conducted in the South Plants Area are (1) the polychlorinated biphenyl (PCB) portions of Element Two of the CERCLA Hazardous

Waste IRA; (2) the Asbestos Removal IRA; and (3) the CPRA IRA. The Consolidated Implementation Document, once implemented, will be part of the CPRA IRA. The CPRA IRA currently consists of five work elements. Individual implementation plans outline the specific actions, schedule, and estimated costs for each work element of the IRA. The work element requirements and details are included in the following referenced implementation plans:

- agent-related equipment and piping removal (TVA 1993);
- phase one of the AST removals (PMRMA 1993);
- phase one nonagent, nonprocess external piping removal (Jacobs 1994a);
- phase one nonagent equipment and piping removal (Jacobs 1994b); and
- nonagent UST removals (EBASCO 1994a).

The South Plants CPRA IRA work elements that are addressed in this Consolidated Implementation Document (Phase II) include the following components:

- removal of nonagent piping and equipment in the South Plants structures;
- removal of external nonagent process piping;
- removal of USTs and ASTs not covered in EBASCO (1994a) or PMRMA (1993);
- removal of electrical conduit that is co-located with those items identified in this document for removal; and
- inventory of equipment in Shell structures.

The Applicable or Relevant and Appropriate Requirements (ARARs) for this Consolidated Implementation Document are identified in the ESD. The ARARs will guide the decisions about disposal of piping and equipment and waste management. Specific ARARs for PCB-related activities and for actions governing UST removal and handling are described in the referenced implementation documents (Weston 1994; EBASCO 1994a).

1.2 OBJECTIVE OF THE CPRA INTERIM RESPONSE ACTION

The objective of this CPRA IRA is to remove and decontaminate as much piping and equipment as practicable before structure demolition. This objective is accomplished by evaluating the feasibility of dismantlement and decontamination based on an inventory of the process piping and equipment currently located in structures that may be demolished. These data are used to develop procedures and cost estimates.

Dismantling and decontamination procedures recommended in this Consolidated Implementation Document have been reviewed for consistency with the *Detailed Analysis of Alternatives* (EBASCO 1994b). These procedures are consistent with the options presented in the *Detailed Analysis of Alternatives* as part of the structures feasibility study. The piping and equipment decontamination and demolition will minimize the potential for contaminant exposure by removing potential sources (that is, contaminated liquids or sludges in piping and equipment) before structural demolition. This procedure will make the structure remediation program safer and more efficient. The removal of equipment and piping, which can be salvaged, will also reduce the volume of waste that will be generated during structure demolition.

All piping, tanks, equipment and associated wiring after removal from the installed location will be defined as "Waste" or "Salvageable Material" for purposes of this Consolidated Implementation Document. "Waste" will be subdivided into hazardous and non-hazardous based on Resource Conservation and Recovery Act (RCRA) and accompanying regulations. "Salvageable Material" consists of reusable items which are maintained in their manufactured form and used in that form and scrap to be processed and reformed into a new product.

It is recognized that all piping, tanks, equipment and associated wiring after removal from the installed location is defined as debris under RCRA. The use of the word "debris" in this document will be in the context of conforming to the regulatory requirements for debris.

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2.0 CONSOLIDATED INTERIM RESPONSE ACTION PROCEDURES

There are several distinct advantages to using the Consolidated Implementation Document approach. The first is the reduction in time and costs associated with preparing and reviewing individual implementation documents. The second is that the integrated approach minimizes the possibility of an item or activity being left unresolved. Third, integrating the approach allows consolidated scheduling and planning to better define and delineate the responsibilities for the various contractors. Fourth, an integrated document allows flexibility for funding and implementing work elements as part of the ongoing PMRMA programs. Finally, the integrated approach allows continuity with the ongoing programs and other work elements.

Several activities have been incorporated into this program to assist with preparation of the Consolidated Implementation Document. Meetings with parties involved in the other ongoing IRA programs and work elements, correspondence with Shell to establish the boundaries of the program, and discussions with Organizations and State (OAS) to assess debris management and contamination assessment issues have been included to open communication lines so that this final document will contain mutually agreed upon decisions and information. It is PMRMA's responsibility, through implementation documents, to establish general requirements for assessing contamination and managing waste and salvageable materials.

The ongoing IRA programs and work elements requiring the most coordination have been PCB removal actions, and AST and UST programs. Meetings were held to identify the current scopes of work and the work to be completed. The purpose of

the meetings was to avoid omission or duplication of key elements, which is a high priority for this work element.

2.1 THE CONSOLIDATED IMPLEMENTATION DOCUMENT

For this Consolidated Implementation Document, summary tables have been used to display information associated with piping, equipment, ASTs, USTs, asbestos, and PCB-contaminated items. These summary tables are the result of an extensive and detailed document survey and the sampling and analysis program. Sampling and analysis results were used to assess potential contamination and to establish necessary decontamination procedures to maximize the amount of salvageable material. The information from the contamination assessment and detailed inventory was used to establish procedures to categorize and characterize the tanks, piping, and equipment. The tables also show what is an Army removal and what is a Shell removal action to provide a summary of components the Army is targeting for removal actions.

The Settlement Agreement (United States and Shell 1988) defines which actions will be performed by the Army and which will be performed by Shell. Shell has the option of following plans set forth in this Consolidated Implementation Document for removal of items inventoried, developing their own removal plans, or implementing the plans contained in the ROD when it is issued.

This Consolidated Implementation Document has been subjected to the review system established in the FFA and has been finalized; therefore, removal actions will be planned for all or portions of the work described in the document. RMA will submit a Notification Letter to notify OAS of work planned for completion.

2.2 NOTIFICATION AND COMPLETION LETTERS

The Notification Letter is a component of the consolidated implementation procedure at RMA. The Notification Letter will provide specific details about plans for conducting a removal project, cost and schedule information for each project, unique sampling and analysis requirements, revised decontamination and demolition operations, and any activity or site-specific waste management or health and safety issues. Extensive coordination between PMRMA and OAS will be necessary to facilitate the implementation of the Notification and Completion Letters. If the planned work will deviate from the procedures in the Consolidated Implementation Document, the Notification Letter will provide an explanation (e.g., if a different method for disposal is going to be implemented for a particular portion of work based on recent policy developments).

An example of the Notification Letter is provided in Appendix A. The intent of the Notification Letter is to provide specific removal activity information to the OAS. The Notification Letter will be issued to the OAS 30 days before the start of removal activities. If more information is requested by OAS, a tour of the project site and a briefing about the work to be performed will be provided to OAS representatives.

After the work that is described in each Notification Letter is completed, a brief (one- to two-page) Completion Letter will be issued. The Completion Letter will summarize the project and give waste disposal data. The specific disposal facilities for any waste not disposed of through the Defense Reutilization and Marketing Office (DRMO) and the Central Waste Handling Area (CWHA) will be identified.

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3.0 CONTAMINATION ASSESSMENT AND CONSOLIDATED INVENTORY

Before developing decontamination and removal approaches, the levels and types of contamination that will be encountered must be considered. The assessment of potential contaminants begins with an understanding of the processes that were performed in the South Plants Area.

The South Plants Area of RMA was used for several types of manufacturing processes ranging from production of chemical munitions and pesticides to steam and electricity production. The steam and electricity production supported post operations and the manufacturing processes. Because of the wide range of activities that occurred in the South Plants Area, the list of potential contaminants is extensive. However, some common concerns based on pervasive contamination are relevant for all work activities performed in the South Plants Area.

Metals and Pesticides in Soil. High levels of metals and pesticides in soil and dust in the South Plants Area have been found in previous studies. Appendix B provides the indicator ranges for metals (EBASCO 1988). Detections above these ranges indicate elevated levels. During removal actions, care will be taken not to generate excessive amounts of dust. A rinse procedure will be used to remove windblown dust. This procedure will be effective for removing the associated contamination from the exterior of piping and equipment.

Animal and Bird Waste. A majority of the buildings are open and animals have used them for shelter. This waste may be removed using a rinse procedure.

Mercury. During the Pilot Building Demolition Study activities, mercury vapor was detected in steam lines in several of the buildings surveyed. Mercury vapor was detected using a real-time mercury vapor analyzer: the Jerome Mercury Vapor Analyzer. In most instances, no visible mercury was found.

Polychlorinated Biphenyls. Use of PCBs in equipment was widespread in the South Plants Area. Roy F. Weston Inc. (Weston) is performing sampling to identify the equipment contaminated by PCBs. When PCB contamination is found, yellow and blue tags are used to indicate the levels detected. Yellow indicates a level that is greater than 50 parts per million (ppm) or greater than 10 micrograms per 100 square centimeters (10 $\mu g/100\ cm^2$), and blue indicates a level less than 50 ppm or less than 10 $\mu g/100\ cm^2$ or a nondetect. The detection level of 50 ppm or 10 $\mu g/100\ cm^2$ trigger (action) under the Toxic Substances Control Act. Weston will be responsible for the decontamination and disposal of PCB-contaminated equipment. For additional information about which equipment is contaminated, refer to Weston's Implementation Letter (Weston 1994).

Each type of manufacturing process, utility operation, laboratory activity, and production support activity performed in the South Plants Area presents a wide range of chemicals of concern. Instead of addressing the specific chemical of concern for each structure, the South Plants Area was divided into seven areas by processes. These seven areas follow similar divisions to the areas presented in the *Contamination Assessment Report* (PMRMA 1990) for areas of "like" contamination, although the Consolidated Implementation Document focuses on production-associated activities.

These areas are as follows:

- Chlorine Plant/Brine/Utility Service Area;
- Warehouse Area;
- White Phosphorus Area;
- Southern Tier Production Area;
- Shop Area;
- Production Support Area; and
- Northern Tier Production Area.

Figure 3-1 shows the location of each of these areas.

The seven areas are helpful in identifying potential areas of contamination based on manufacturing processes. Common items are identified and must be considered within each of these areas, such as salvageable equipment, ASTs, USTs, external piping, and electrical systems. The types of chemicals of concern differ for each area and possibly for each aspect of the work performed in an area depending on, for example, if a storage tank was used for raw material or end product.

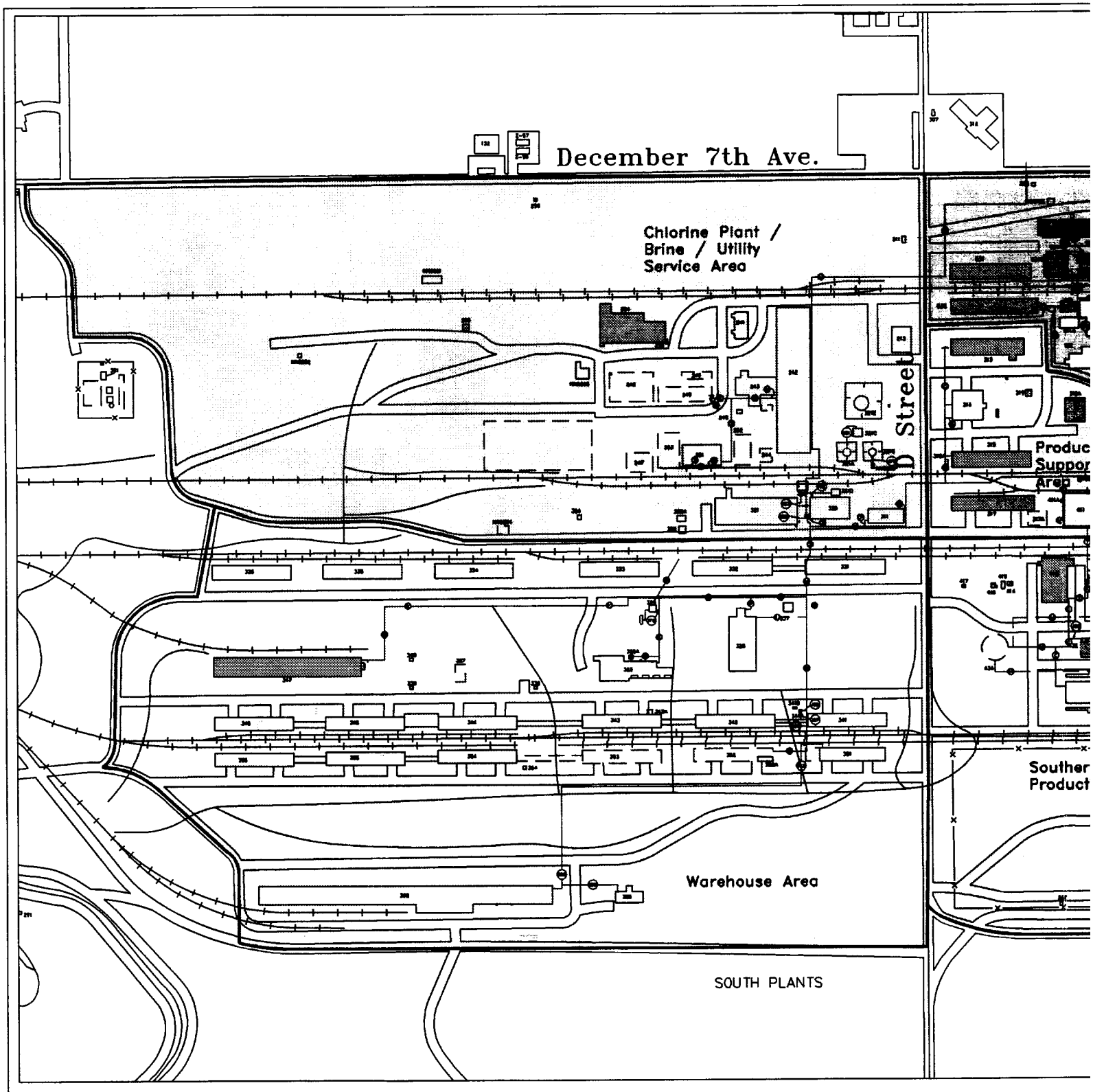
The contaminant assessment is based on historical information concerning processes, previous sampling, and sampling performed during this task. During the building survey and inventory, real-time air monitoring with an organic vapor monitor, a mercury vapor analyzer, and an aerosol monitor was performed. No elevated readings of organic vapors, mercury vapor, or dust were recorded during the survey activities. Wipe, rinsate, residue, and liquid samples were also collected from exterior piping systems and equipment within buildings. The pipe systems identified for sampling were selected based on historical records that indicated a

system's usage was unknown or was associated with the chemical sewer. The equipment sampled was selected because of the presence of visible residues. The sample locations were selected in system areas where the highest probability of finding product exists, such as in low points and valves.

The pipe systems were sampled using a wipe sample technique. This step involved wiping 100 cm^2 of pipe interior with a gauze pad moistened with solvent. The solvent was selected based on specific target analytes for sampling (extraction solvents). If free product (liquid or residue) was found in the pipe system, a grab sample was collected instead of a wipe sample. The wipe samples were analyzed for inductively coupled plasma (ICP) metals, organophosphate pesticides, and organochlorine pesticides. A wipe sample or a grab sample of the residue was collected from the equipment.

Historical contaminants, sampling data, equipment, external piping, AST, and UST information are stored electronically in a database. A separate database contains general structure information, tank, piping, equipment, and sampling data. The databases will be included in DP Associates' comprehensive database. The databases will be kept current using update forms whenever a removal project is completed. The tables in this section were created from the information in the databases.

The following sections provide a contamination assessment for each of the seven areas. The structures, processes, tanks, and equipment discussed are those that are designated as "Army-only" response actions in the Settlement Agreement (United States and Shell 1988). The Shell structures, tanks, and equipment are discussed in Section 3.8. Shell is not required to perform any removal,



LEGEND

- Buildings Owned by Shell
- Nonagent Buildings Leased by Shell
- Agent Buildings Leased by Shell
- Agent Buildings

Figure
South Plants A
Rocky Mountain Arsenal, Co

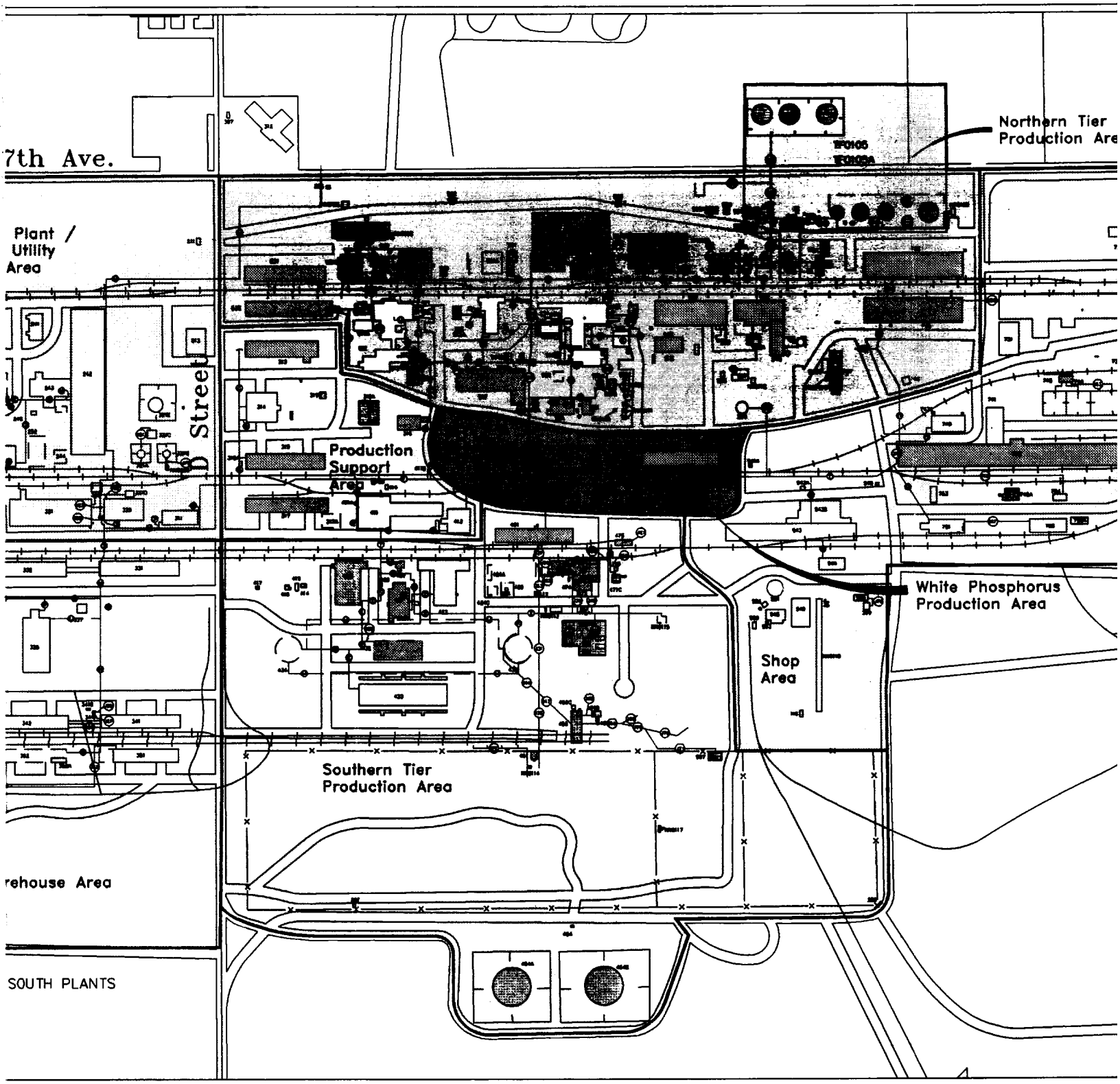


Figure 3–1
South Plants Area Layout
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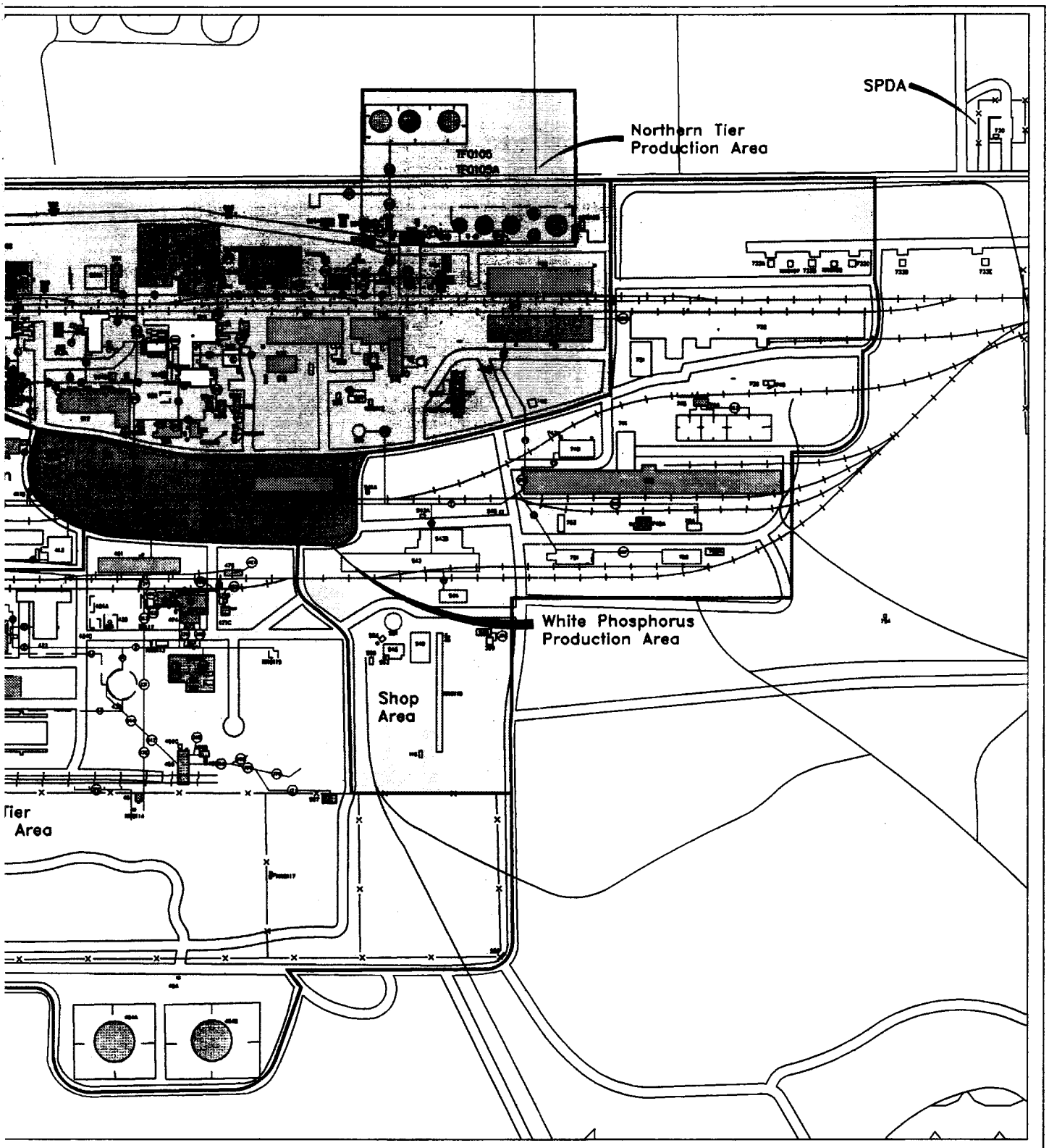

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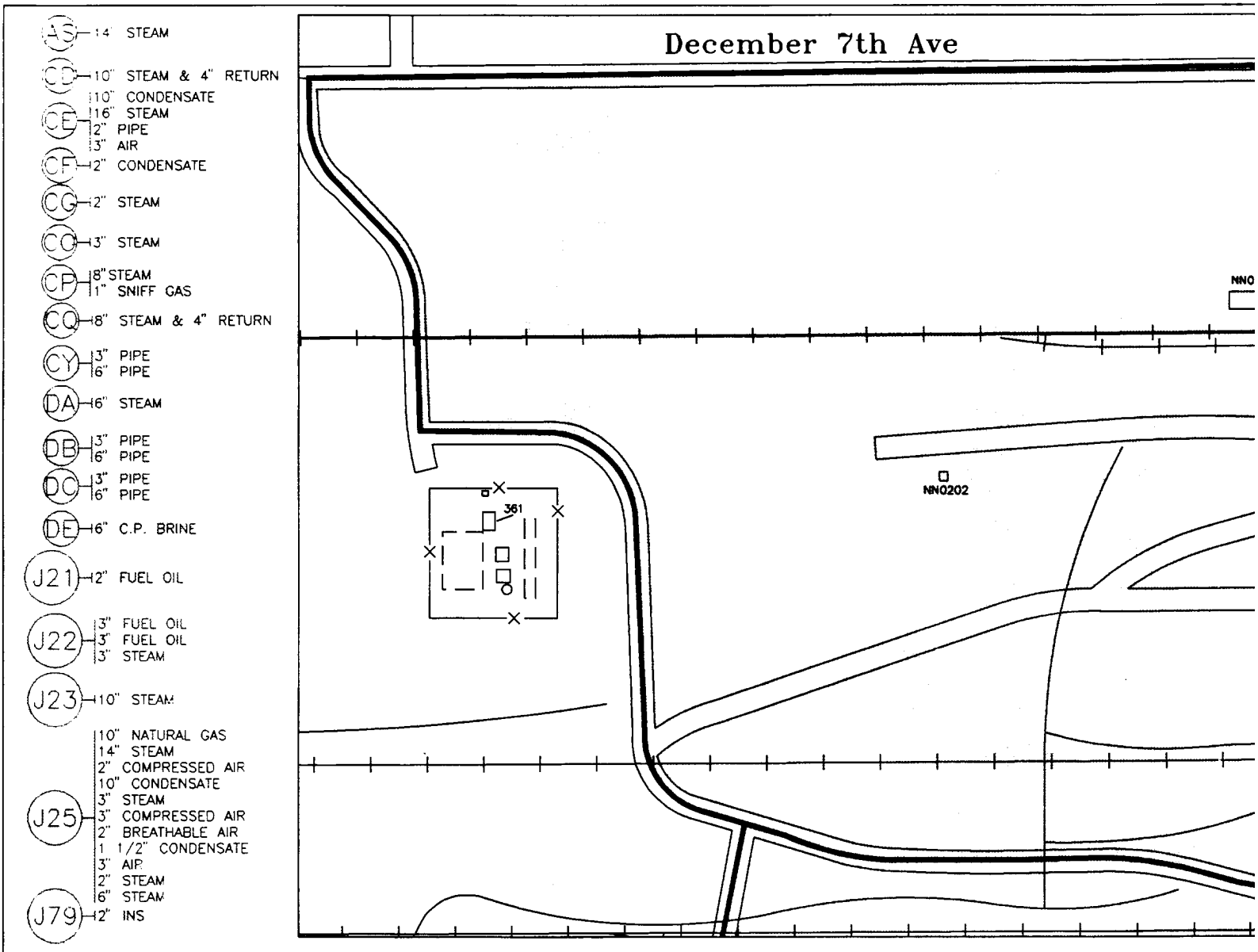

LEGEND

- Buildings Owned by Shell
- Nonagent Buildings Leased by Shell
- Agent Buildings Leased by Shell
- Agent Buildings
- Underground Storage Tanks for Removal
- Aboveground Storage Tanks for Removal

Figure
Chlorine Plant / Brine
Rocky Mountain Arsenal, C

decontamination, or disposal action pursuant to this work element of the IRA. However, Shell does retain the option of performing any actions consistent with this document for items included in the inventory, developing their own removal plans, or implementing the plans contained in the ROD when it is issued. The inventory was previously conducted for this document in 39 Shell buildings.

All tables for Section 3.0 are located at the end of this section.

3.1 CHLORINE PLANT/BRINE/UTILITY SERVICE AREA

The Chlorine Plant/Brine/Utility Service Area is immediately west of D Street and north of the third rail line (starting at December 7th Avenue and proceeding south [Figure 3-2]). The main processes the structures supported in this area are chlorine manufacturing operations, brine use, and the generation of steam and electrical power. The exception is Building 213, which functioned as an X-ray facility. This area contains external piping, USTs, ASTs, and equipment that will be evaluated for removal.

The external piping in the Chlorine Plant/Brine/Utility Service Area transported process and utility components. The majority of the piping was for the utility distribution system. Of the 5,400 feet of piping, 25 percent is identified as unknown use and will have to be characterized at the time of removal. The piping inventory does identify "Sniff" lines (Sniff is a mixture of hydrogen, chlorine, and carbon dioxide). No chemical sewer line existed in this area. The location of the external piping in this area is illustrated in Figure 3-2.

Two USTs in this area were not previously identified for removal. One UST contained water and the other contained condensate and water (Table 3-1).

Six ASTs in this area were also not previously identified for removal. The ASTs stored oil, gasoline, and water (Table 3-2).

The equipment identified as salvageable in this area consists mostly of pumps and motors (Table 3-3). The chemicals of concern for these items are fuel oil and natural gas. Two X-ray machines, from Building 213, were also identified for salvage.

The chemical of concerns for the Chlorine Plants/Brine/Utility Service Area are those associated with the main processes that were supported by the structures. The historical contaminants and contaminants found during sampling for the structures of interest to this study are listed in Table 3-4. A small amount of asbestos-containing material (ACM) is present in Buildings 211, 213, 321D, and 323. No mercury was detected, no mercury-containing equipment was observed, and no PCB-containing transformers were located in these structures.

3.2 WAREHOUSE AREA

The Warehouse Area is located immediately west of D street and proceeds south approximately 1,200 feet from the third rail line (Figure 3-3). The drummed raw materials and finished products for the pesticide manufacturing processes were stored in the structures in this area. Some of the warehouses housed the filling of munitions. A Goop-mixing facility is also located in this area. This area contains exterior piping, ASTs, and equipment that will be evaluated for removal.

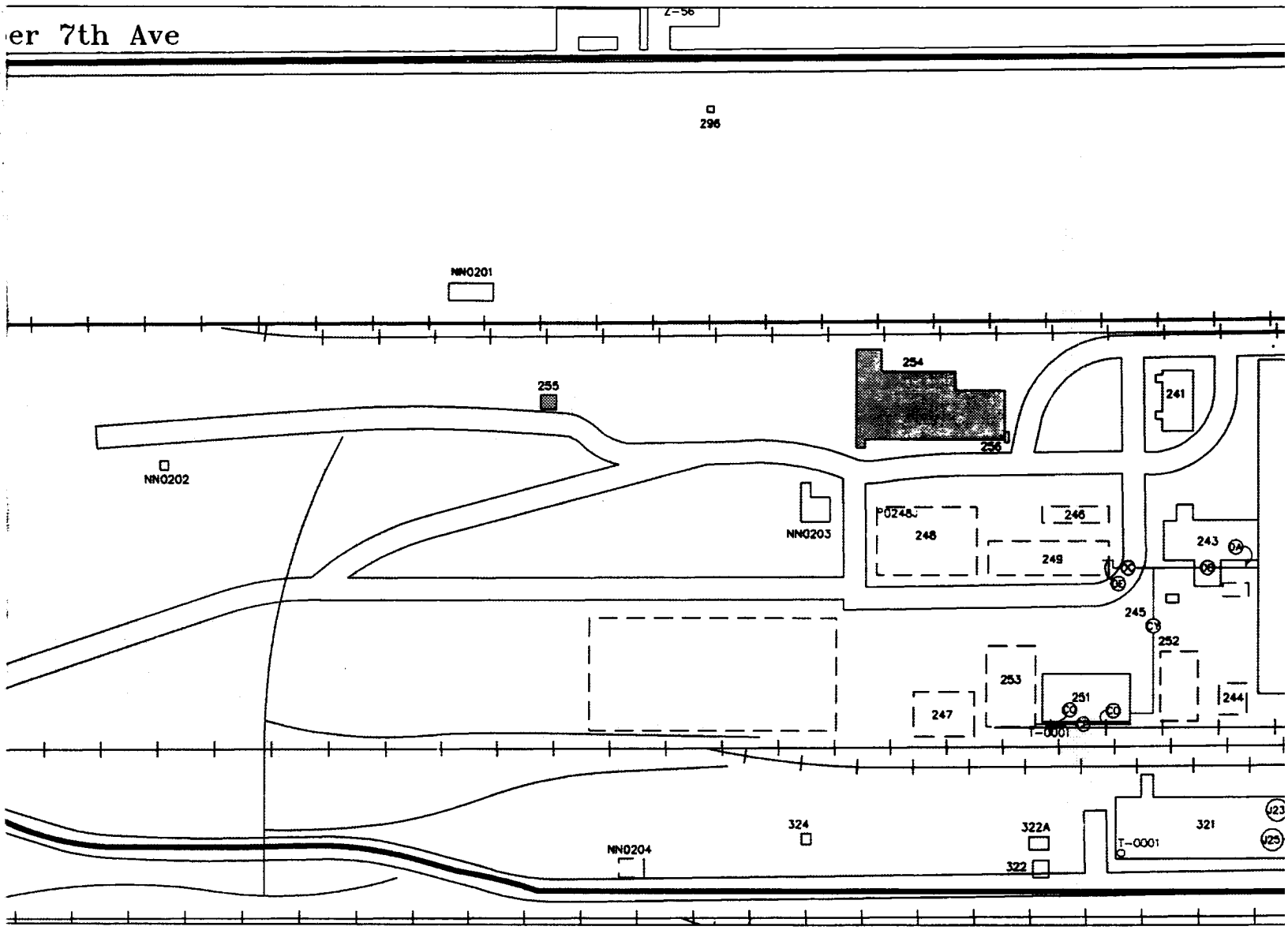

Figure 3-2
Chlorine Plant / Brine / Utility Service Area
cky Mountain Arsenal, Commerce City, Colorado

NOTE: Nonagent
in RED t

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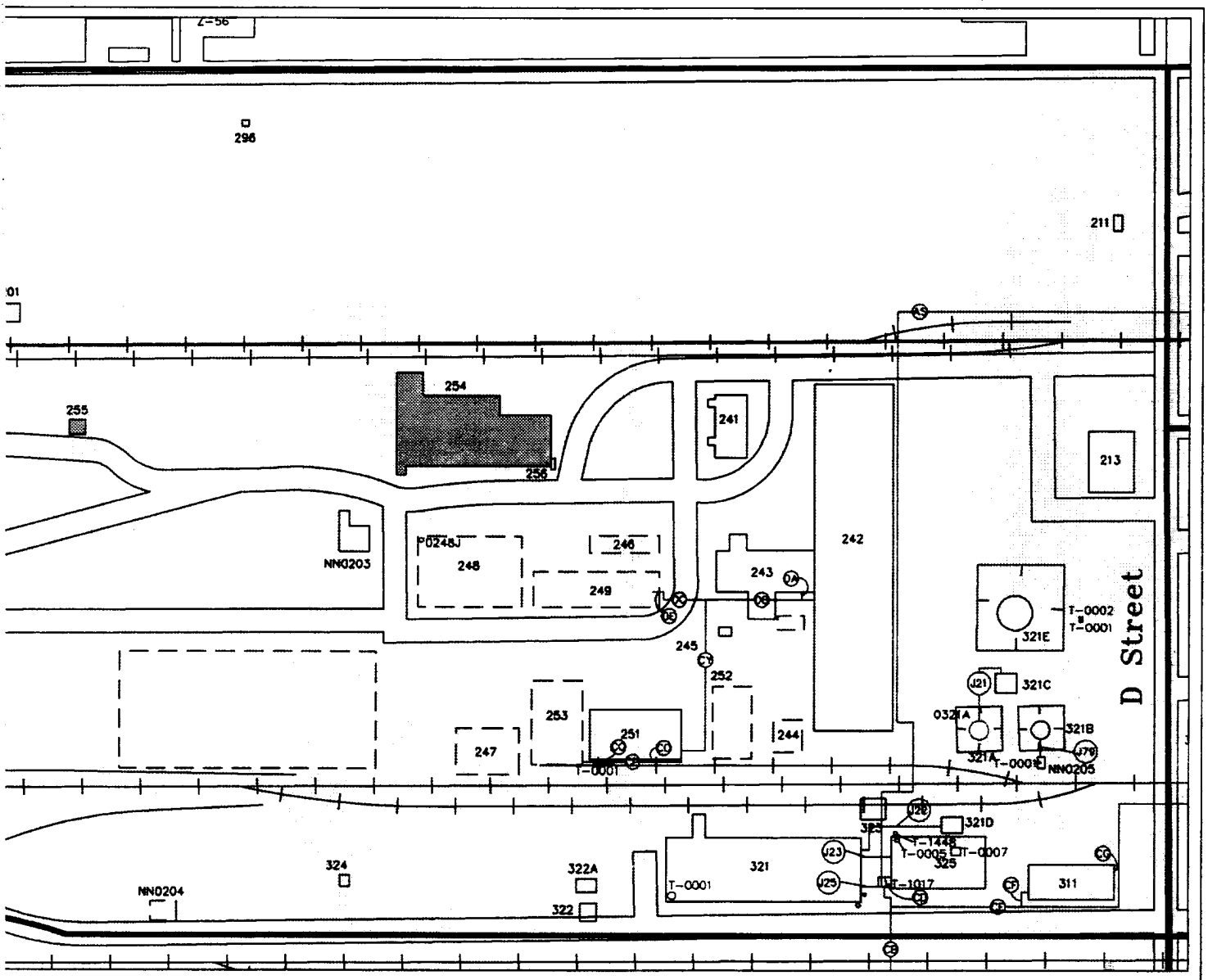

5-2
' Utility Service Area
mmerce City, Colorado

NOTE: Nonagent, nonprocess piping is identified in RED text.

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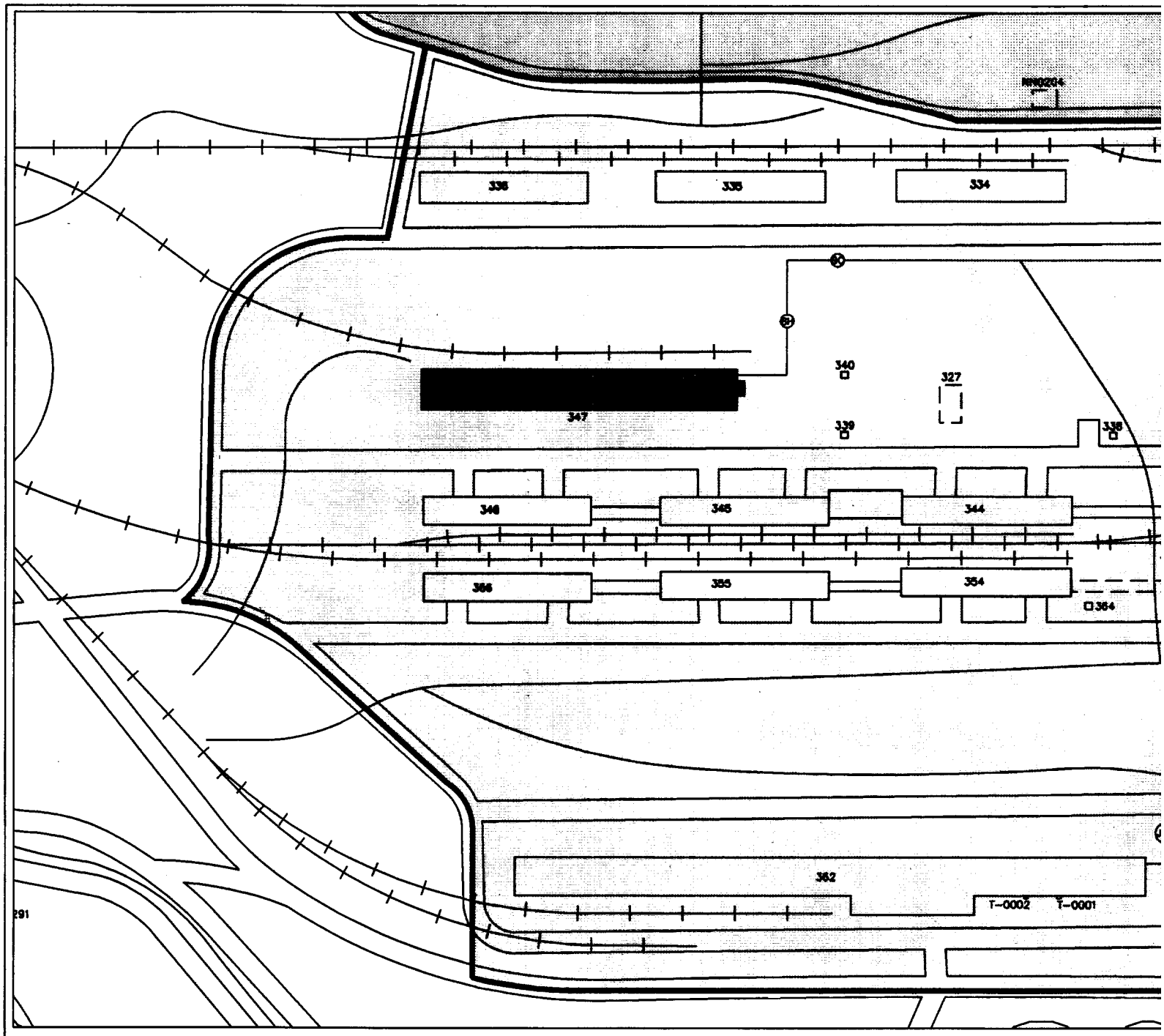


LEGEND

- Buildings Owned by Shell
- Nonagent Buildings Leased by Shell
- Agent Buildings Leased by Shell
- Agent Buildings
- Underground Storage Tanks for Removal
- Aboveground Storage Tanks for Removal

BA — 6" STEAM & 3" RETURN; 3" AIR; 2" SNIFF GAS

BC — 4" STEAM & 2" RETURN

BD — 6" STEAM & 3" RETURN; 3" AIR

BF — 1 1/2" STEAM & 1" RETURN

BG — 6" STEAM & 3" RETURN; 3" AIR

BH — 3" STEAM & 1 1/2" RETURN

BI — 3" STEAM; 3" CONDENSATE

BJ — 2" SNIFF

BK — 6" STEAM & 3" RETURN; 3" AIR; 2" SNIFF GAS

BL — 2-2" GASOLINE; 6" STEAM & 3" RETURN; 3" COMPRESSED AIR

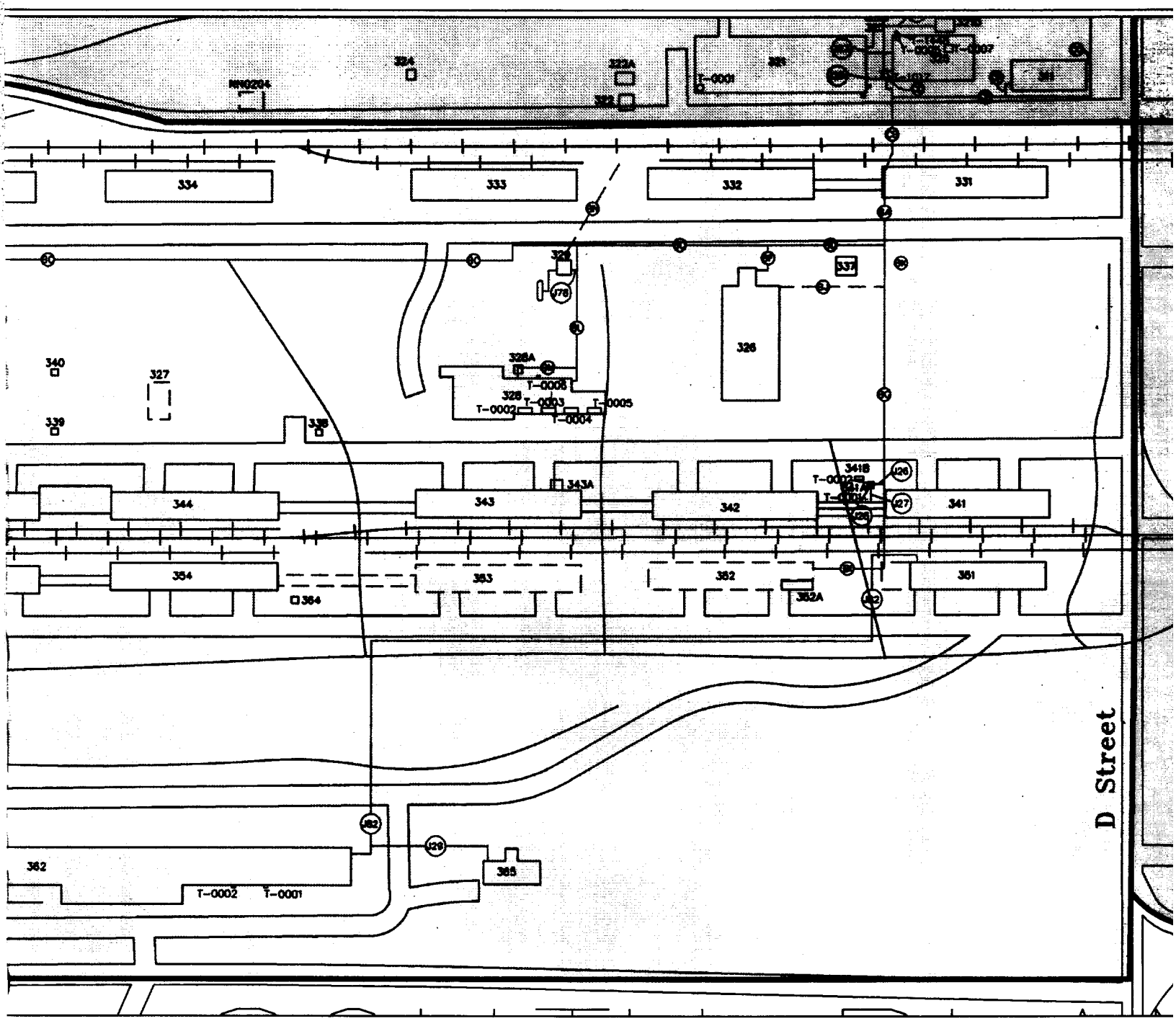
BM — 2-2" GASOLINE; 3" COMPRESSED AIR

BN — 3" GASOLINE

CB — 14" NATURAL; 2" AIR; 3" AIR; 10" CONDENS; 14" STEAM; 2" CONDENSA; 2" BREATHAB; 3" COMPRESS; 6" STEAM

J26 — 1 1/2" STEA; 3" CONDENSA; 1" PIPE

Figure 3
Warehouse
Rocky Mountain Arsenal, Co



6" STEAM & 3" RETURN
3" AIR
2" SNIFF GAS
2-2" GASOLINE
6" STEAM & 3" RETURN
3" COMPRESSED AIR
2-2" GASOLINE
3" COMPRESSED AIR
3" GASOLINE

CB
14" NATURAL GAS
2" AIR
3" AIR
10" CONDENSATE
14" STEAM
2" CONDENSATE
2" BREATHABLE AIR
3" COMPRESSED AIR
6" STEAM

J26
1 1/2" STEAM
3" CONDENSATE
1" PIPE

J27
2 1/2" STEAM
14" NATURAL GAS
2" AIR
3" AIR
10" CONDENSATE
14" STEAM
2" CONDENSATE
2" BREATHABLE AIR
3" COMPRESSED AIR
6" STEAM

CB
1 1/2" STEAM
3" CONDENSATE
1" PIPE

J26

J27
2 1/2" STEAM

J28
6" STEAM

J29
3" COMPRESSED AIR
3" STEAM
1" CONDENSATE
1" AIR

J78
2- 2" GASOLINE

J82
4" STEAM
2" CONDENSATE
3" AIR

NOTE: Nonagent, nonproc
in RED text.

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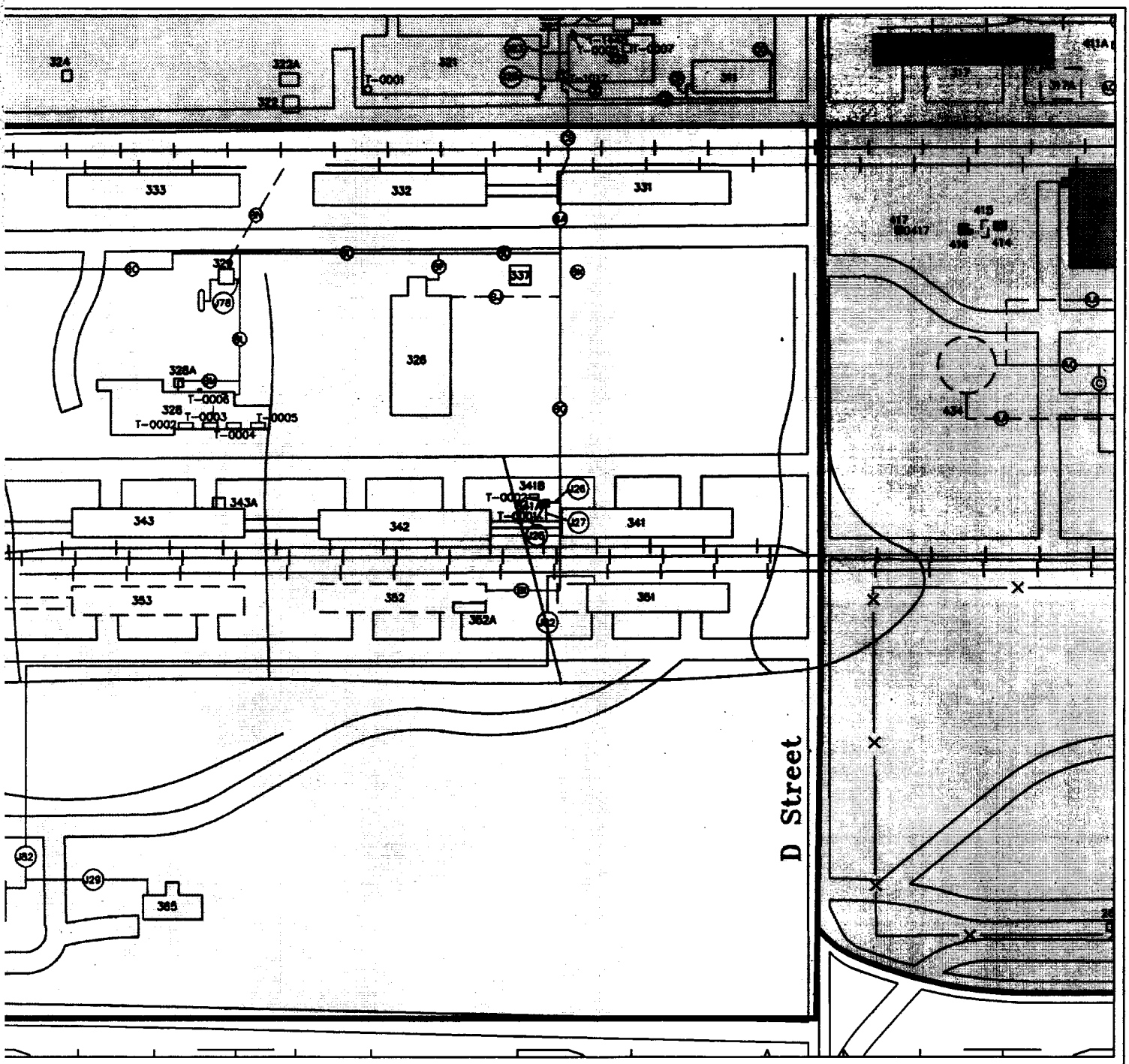
Prepared by I

Figure 3-3
Warehouse Area
Mountain Arsenal, Commerce City, Colorado



'AL GAS

ENSATE

NSATE
ABLE AIR
ESSED AIR

EAM
NSATE

J27 — 12 1/2" STEAM
14" NATURAL GAS
2" AIR
3" AIR
10" CONDENSATE

CB — 14" STEAM
2" CONDENSATE
2" BREATHABLE AIR
3" COMPRESSED AIR
6" STEAM

J26 — 1 1/2" STEAM
3" CONDENSATE
1" PIPE

J27 — 12 1/2" STEAM

J28 — 6" STEAM

J29 — 3" COMPRESSED AIR
3" STEAM
1" CONDENSATE
1" AIR

J78 — 2- 2" GASOLINE

J82 — 4" STEAM
2" CONDENSATE
3" AIR

N

0 100 200

Scale 1" = 200'

NOTE: Nonagent, nonprocess piping is identified in RED text.

3-3

e Area

ommerce City, Colorado

JACOBS ENGINEERING GROUP INC.

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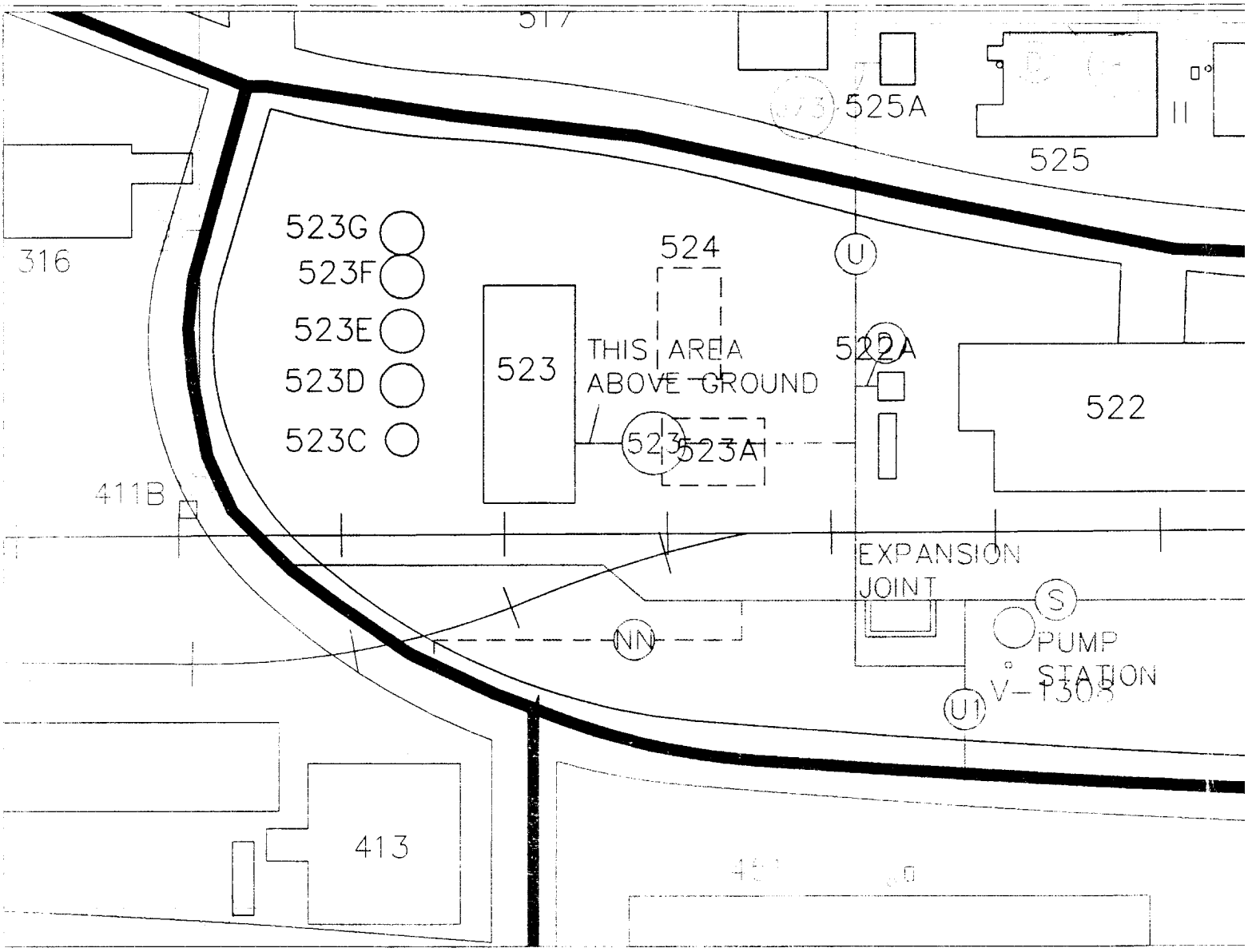
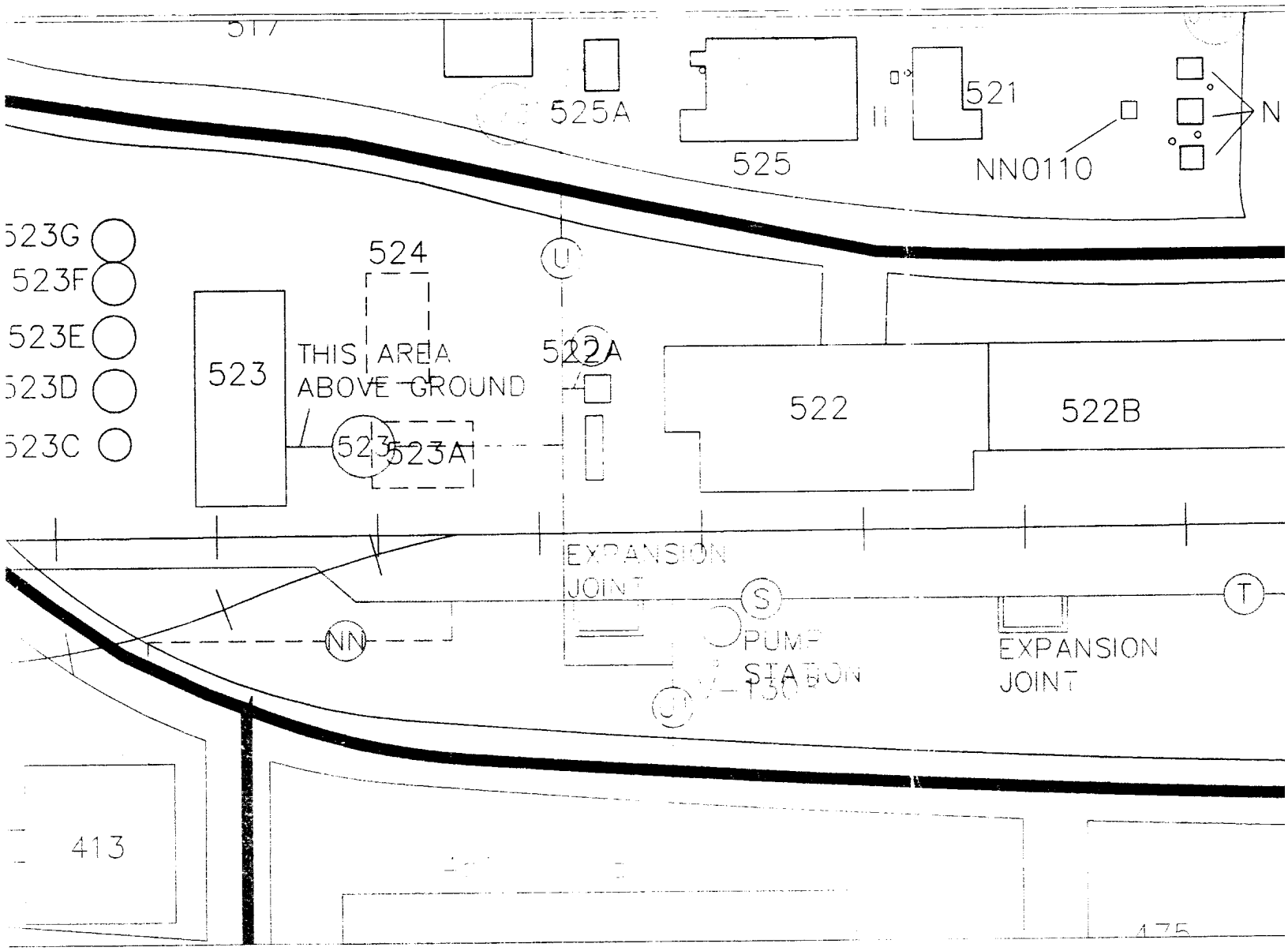


LEGEND

- Buildings Owned by Shell
- Nonagent Buildings Leased by Shell
- Agent Buildings Leased by Shell
- Agent Buildings
- Underground Storage Tanks for Removal
- Aboveground Storage Tanks for Removal

Figu
White Phosphor
Rocky Mountain Arsena



Shell

eased by Shell

ed by Shell

Tanks for Removal

Tanks for Removal

Figure 3-4

White Phosphorus Production Are

Rocky Mountain Arsenal, Commerce City,

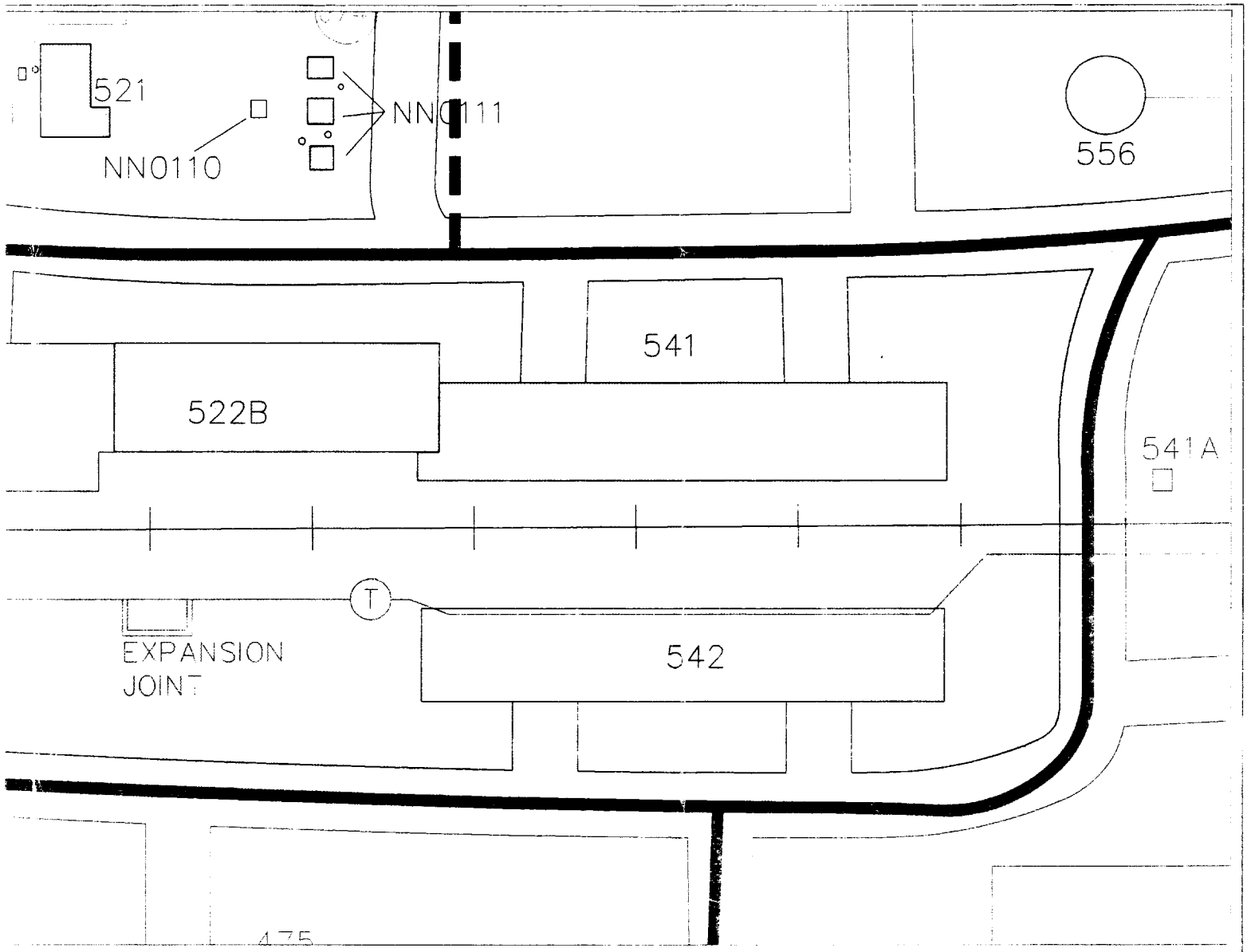


Figure 3-4
horus Production Area
eral, Commerce City, Colorado

NOTE Nonagent, nonprocess piping is identified in text.

JACOBS ENGINEERING GROUP INC.

Prepared by Dp Associates

FINAL
Recycled

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The removal actions for the piping, equipment, and tanks in this area will be handled as part of the agent CPRA IRA. The White Phosphorus Area is excluded from this document because of its relationship to agent chemical-related processes. Only the inventory of the equipment in Building 542 will be included in this document.

3.4 SOUTHERN TIER PRODUCTION AREA

The Southern Tier Production Area is located east of D Street and extends southward from the fourth rail line. This area was used to produce munitions and intermediates for insecticides and to store equipment in the salvage yards. This area contains exterior piping, USTs, ASTs, and equipment that will be evaluated for removal. No buildings in this area are addressed in this document because they are part of the Shell-only actions, part of the agent work element, or part of the Pilot Building Demolition Study (but they are included in the database). Shell may perform the removal actions as part of this IRA, develop their own removal plans, or defer them to the post-ROD clean-up action.

The exterior piping addressed in this document excludes piping located where agent lines are in the pipe rack. Removal of pipelines with the potential for agent contamination will be sampled. If the analytical results from sampling indicate agent contamination, the pipelines removal will be part of the agent chemical process-related activities IRA. If no agent contamination is found, they will be removed under the plans set forth in this Consolidated Implementation Document. Figure 3-5 shows the location of the piping in this area.

Tanks not associated with, and located outside of, agent buildings are addressed in this document (Figure 3-5). USTs in this area that are considered for removal are listed in Table 3-10. Two of the USTs have last-known contents of lime slurry and byproducts from the mustard decontamination pit. The remaining four USTs have unknown contents.

There are 19 ASTs in this area, with 9 having last-known contents of carbon tetrachloride, nemagon, mineral spirits, coolant, caustics, bromine, and pesticides or pesticide raw materials. The remaining 10 have unknown contents. These ASTs are listed in Table 3-11.

Most of the equipment to be removed in this area is in the Army Salvage Yard. No historical contamination information is available for this equipment; therefore, the items are assumed to be contaminated unless the status can be otherwise established. The contamination of concern for this equipment is the surficial dust that has accumulated. The equipment consists of miscellaneous items (e.g., flag pole, piping, culverts, stair steps) and is listed in Table 3-12.

The contaminants of concern for the Southern Tier Production Area are the chemicals that were distributed by the pipe system, unknown and known chemicals in the tanks, and the surficial soil and dust contamination. The results of the analyses of samples from this area are presented in Table 3-13.

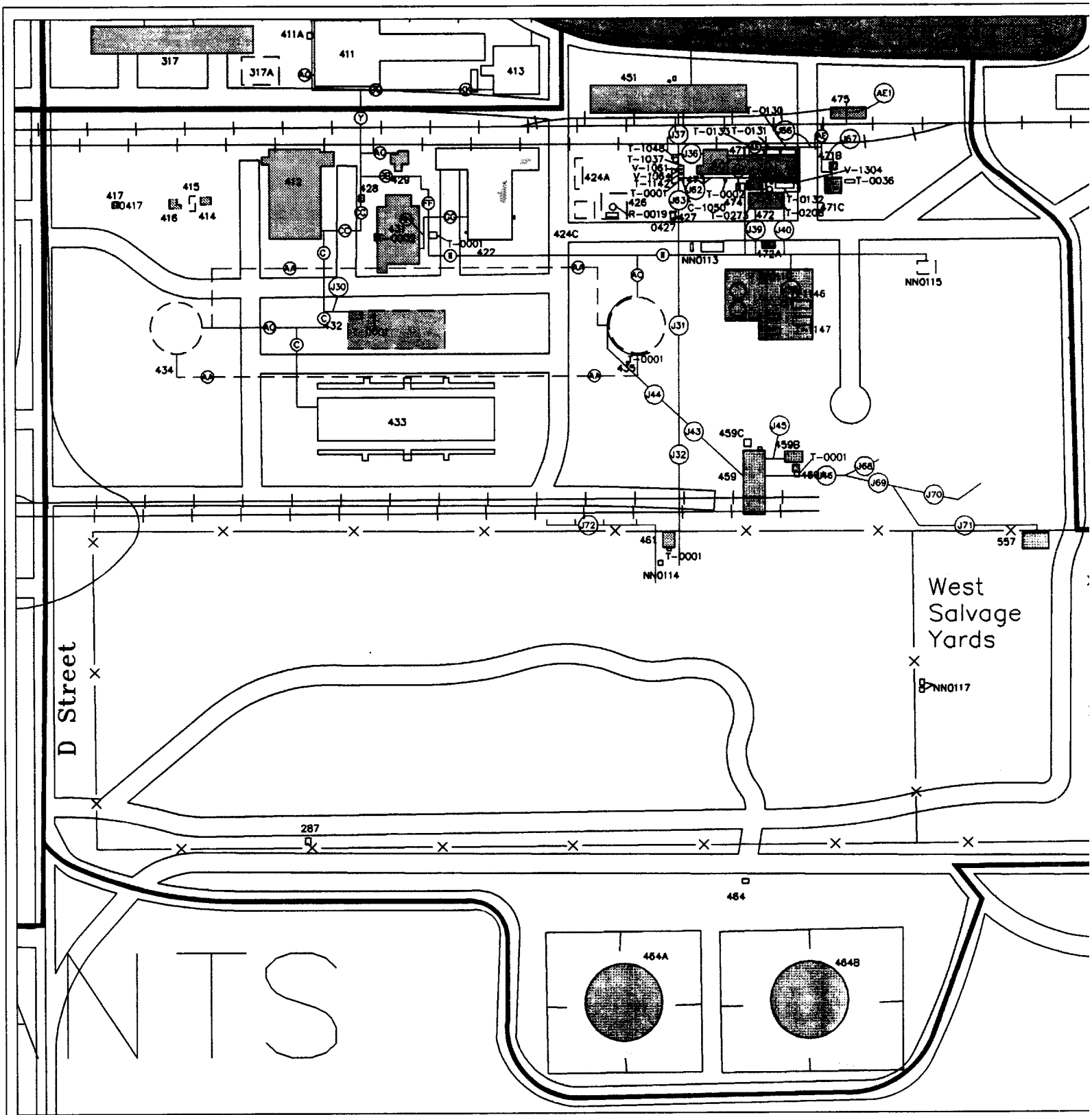
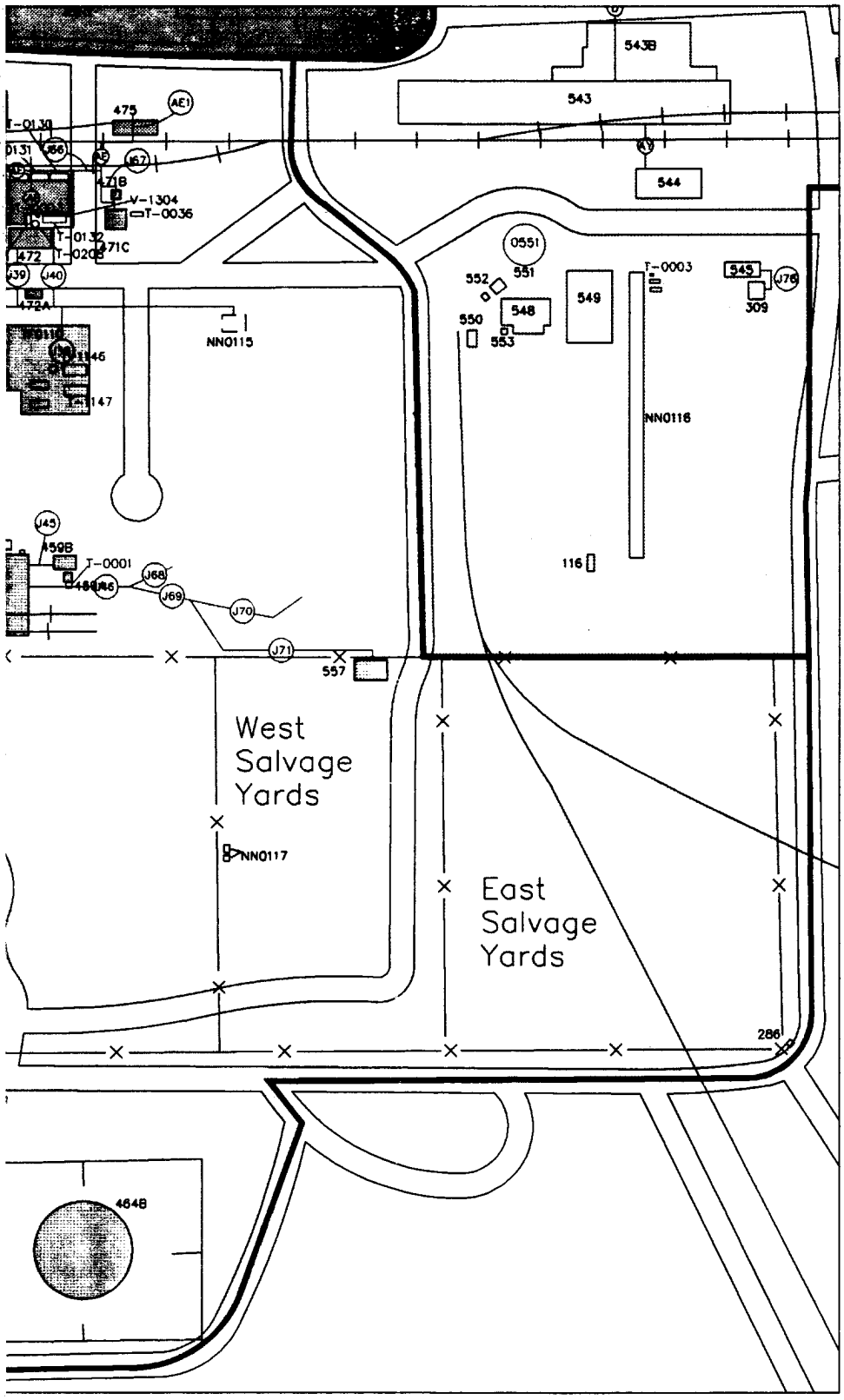


Figure
Southern Tier Pr
Rocky Mountain Arsenal, C



C — 3" STEAM; 2" CONDENSATE

Y — 1" SNIFF; PIPE; PIPE; SD; CAUSTIC; CHLORINE; PIPE; SM; SM; CHLORINE; 6" STEAM; 3" CONDENSATE

AA — 4" ETHYLENE (UNDERGROUND)

AE — 4" STEAM; 2" CONDENSATE; AIR; TMP VENT; TMP

AF — 2" NATURAL GAS; 4" STEAM; PIPE; CONDENSATE; PIPE

AG — 2" STEAM; PIPE; PIPE; PIPE; PIPE; PIPE

AH — 4" REFRIGERANT; 2" AIR

AI — 1" CHLORINE; 3" CHLORINE; SD; 2-3" SM; 2-2" CAUSTIC; 1 1/2" BRINE; 1 1/2" VENT; 6" STEAM; 3" CONDENSATE

CC — 1 1/2" BRINE; 2-3" SM; 2" CAUSTIC; 6" STEAM; 3" CONDENSATE

FF — 1" CHLORINE; 3" CHLORINE; SD; 2-3" SM; 2-2" CAUSTIC; 1 1/2" VENT; 6" STEAM; 3" CONDENSATE

GG — 1 1/2" VENT; 1" CHLORINE; 2-3" SM; 2" CAUSTIC; 2-10" BRINE; 6" ETHYLENE; 4" STEAM; 2" CONDENSATE

HH — 2-10" BRINE; 6" ETHYLENE; 2" PIPE; 1 1/2" VENT

II — 3" STEAM; 2" CONDENSATE; 3" CHLORINE; SD; 2" CAUSTIC; 3" PIPE; 1" CHLORINE

AQ — 2" STEAM

J30 — 2" STEAM; 1 1/2" CONDENSATE

J31 — 1" CARBON DIOXIDE; 2" AIR; 2 1/2" ACETYLENE; 1/2" AIR; 2" STEAM; 1" NITROGEN; 2" FUEL OIL; 3" STEAM; 2" FUEL OIL

J32 — 3" STEAM; 2" CONDENSATE; 3" FUEL OIL; 2" FUEL OIL; 1" NITROGEN; 2" AIR

J36 — 2" NATURAL GAS; 4" PROCESS VENT; 3" PROCESS VENT; 3" PROCESS VENT; 3" STEAM; 3" TEMPERED WATER; 3" TEMPERED WATER; 1 1/2" VAPONA; 1 1/2" AIR; 2" CHEM SEWER; 1 1/2" CONDENSATE; 2" CHEM SEWER

J37 — 2" NATURAL GAS/BC; 2 1/2" ACETYLENE; 1/2" CARBON DIOXIDE; 2" 20% CAUSTIC; 2" WATER; 1" FUEL OIL; 1 1/2" AIR; 2" BREATHABLE AIR; 4" VAPONA VENT; 2" CHEMICAL SEWER; 1 1/2" VAPONA; 2" EFFLUENT; 3" TEMPERED WATER; 3" TEMPERED WATER; 3" STEAM

J38 — 2" STEAM; 2" TMP; 1 1/2" NITROGEN; 1 1/2" CHLORAL; 2" NITROGEN; BREATHABLE AIR; 2" VENT; 1 1/2" NITROGEN; 1" POTABLE WATER; 1 1/2" PROCESS; PROCESS WATER; 1 1/2" PROCESS; NITROGEN; 1 1/2" TEMPERED WATER; 1 1/2" TEMPERED WATER; 1" NITROGEN; 1" PIPE

J39 — 3" STEAM; 1 1/2" PIPE; 1" NATURAL GAS; 1 1/2" PROCESS VENT; 1 1/2" TEMPERED WATER; 1 1/2" TEMPERED WATER; 4" PROCESS VENT

J40 — 2" CHLORAL; 2" TMP; 3/4" NITROGEN; 2" CONDENSATE; 1 1/2" PROCESS; 1 1/2" PROCESS

J43 — 2 1/2" ACETYLENE; 1 1/2" AIR; 2" STEAM; 6" ETHYLENE; 6" ETHYLENE; 3" PIPE

J44 — 6" ETHYLENE; 6" ETHYLENE; 3" PIPE; 1 1/2" AIR

J45 — 1" PIPE; 1" PIPE; 2" PIPE; 2" PIPE

J46 — 1 1/2" PIPE; 1 1/2" PIPE

N

NOTE: Nonagent, nonproce
in RED text.

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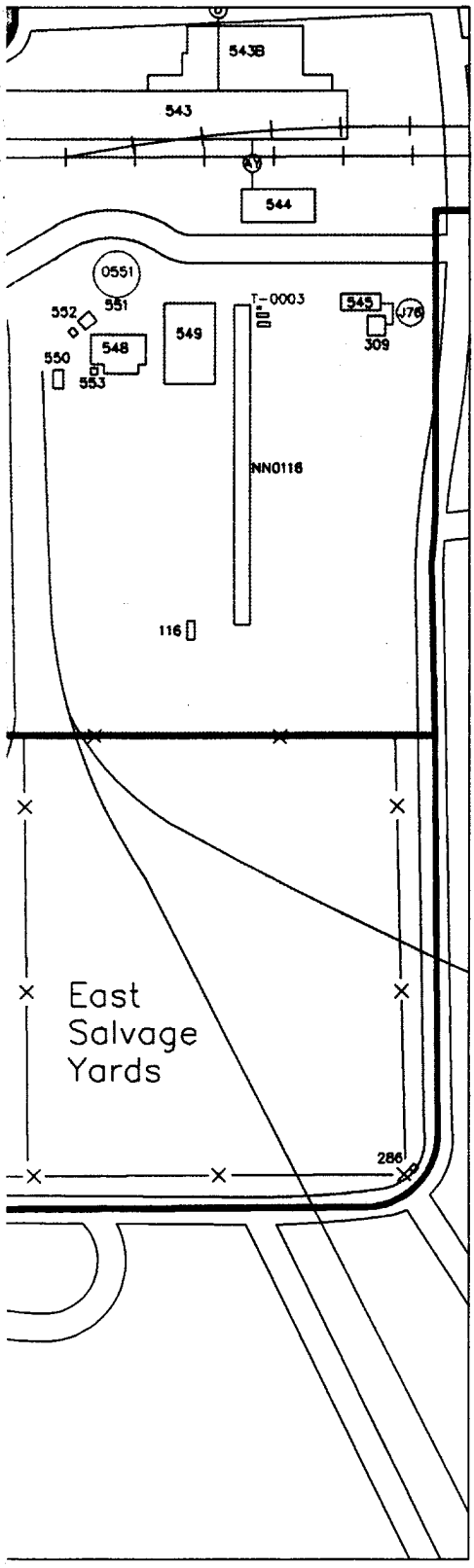
Prepared by I

Figure 3–5
Southern Tier Production Area
Mountain Arsenal, Commerce City, Colorado



C
- 3" STEAM
- 2" CONDENSATE

Y
- 2" SNIFF
- 2" PIPE
- 2" PIPE
- 3" SD
- 3" CAUSTIC
- 2" CHLORINE
- 2" PIPE
- 3" SM
- 3" SM
- 6" PIPE
- 1" CHLORINE
- 6" STEAM
- 3" CONDENSATE

AA
- 14" ETHYLENE (UNDERGROUND)

AE
- 4" STEAM
- 2" CONDENSATE
- 2" AIR
- 2" TMP VENT
- 2" TMP

AF
- 2" NATURAL GAS
- 4" STEAM
- 1" PIPE
- 2" CONDENSATE
- 2" PIPE

AG
- 2" STEAM
- 1" PIPE
- 3" PIPE

AH
- 3" PIPE
- 1" PIPE
- 1" PIPE
- 3" PIPE

AI
- 4" REFRIGERANT
- 2" AIR

BB
- 1" CHLORINE
- 3" CHLORINE
- 3" SD
- 2-3" SM
- 2-2" CAUSTIC
- 1 1/2" BRINE
- 1 1/2" VENT
- 6" STEAM
- 3" CONDENSATE

CC
- 1 1/2" BRINE
- 2-3" SM
- 2" CAUSTIC
- 6" STEAM
- 3" CONDENSATE

FF
- 1" CHLORINE
- 3" CHLORINE
- 3" SD
- 2-3" SM
- 2-2" CAUSTIC
- 1 1/2" VENT
- 6" STEAM
- 3" CONDENSATE

GG
- 1 1/2" VENT
- 1" CHLORINE
- 2-3" SM
- 2" CAUSTIC
- 2-10" BRINE
- 6" ETHYLENE
- 4" STEAM
- 2" CONDENSATE

HH
- 2-10" BRINE
- 6" ETHYLENE
- 2" PIPE
- 1 1/2" VENT

II
- 3" STEAM
- 2" CONDENSATE
- 3" CHLORINE
- 3" SD
- 2" CAUSTIC
- 3" PIPE
- 1" CHLORINE

AQ
- 2" STEAM

J30
- 2" STEAM
- 1 1/2" CONDENSATE

J31
- 1/2" CARBON DIOXIDE
- 2" AIR
- 2 1/2" ACETYLENE
- 1/2" AIR
- 2" STEAM
- 1" NITROGEN
- 2" FUEL OIL
- 3" STEAM
- 2" FUEL OIL

J32
- 3" STEAM
- 2" CONDENSATE
- 3" FUEL OIL
- 2" FUEL OIL
- 1" NITROGEN
- 2" AIR

J36
- 2" NATURAL GAS
- 4" PROCESS VENT
- 3" PROCESS VENT
- 3" PROCESS VENT
- 3" STEAM
- 3" TEMPERED WATER
- 3" TEMPERED WATER
- 1 1/2" VAPONA
- 1 1/2" AIR
- 2" CHEM SEWER
- 1/2" CONDENSATE
- 2" CHEM SEWER

J37
- 2" NATURAL GAS/BCH
- 2 1/2" ACETYLENE
- 1/2" CARBON DIOXIDE
- 2" 20% CAUSTIC
- 2" WATER
- 1" FUEL OIL
- 1 1/2" AIR
- 2" BREATHABLE AIR
- 4" VAPONA VENT
- 2" CHEMICAL SEWER
- 1 1/2" VAPONA
- 2" EFFLUENT
- 3" TEMPERED WATER
- 3" TEMPERED WATER
- 3" STEAM

J38
- 2" STEAM
- 2" TMP
- 1 1/2" NITROGEN
- 1 1/2" CHLORAL
- 1/2" NITROGEN
- 1" BREATHABLE AIR
- 2" VENT
- 1/2" NITROGEN
- 1" POTABLE WATER
- 1 1/2" PROCESS
- 1" PROCESS WATER
- 1 1/2" PROCESS
- 1" NITROGEN
- 1 1/2" TEMPERED WATER
- 1 1/2" TEMPERED WATER
- 1" NITROGEN
- 1" PIPE

J39
- 3" STEAM
- 1 1/2" PIPE
- 1" NATURAL GAS
- 1 1/2" PROCESS VENT
- 1 1/2" TEMPERED WATER
- 1 1/2" TEMPERED WATER
- 4" PROCESS VENT

J40
- 2" CHLORAL
- 2" TMP
- 3/4" NITROGEN
- 2" CONDENSATE
- 1 1/2" PROCESS
- 1 1/2" PROCESS

J43
- 2 1/2" ACETYLENE
- 1 1/2" AIR
- 2" STEAM
- 6" ETHYLENE
- 6" ETHYLENE
- 3" PIPE

J44
- 6" ETHYLENE
- 6" ETHYLENE
- 3" PIPE
- 1 1/2" AIR

J45
- 1" PIPE
- 1" PIPE
- 2" PIPE
- 2" PIPE

J46
- 1 1/2" PIPE
- 1 1/2" PIPE

J62
- 3" PIPE
- 2- 2" CAUATIC
- 1 1/2" PIPE
- 1" NITROGEN
- 1 1/2" AIR
- 3" PIPE
- 1" CAUSTIC
- 2- 1" PIPE
- 1/2" PIPE
- 1" PIPE
- 1 1/2" STEAM
- 1 1/2" PIPE

J63
- 1 1/2" PROCESS WATER
- 1" UTILITY AIR
- 2" STEAM
- 1 1/2" ACETIC ACID
- 2" TMP
- 1" PROCESS
- 2" PROCESS
- 2- 1 1/2" MMAA
- 2" PROCESS
- 2" ACETONE
- 1" MECL
- 6" AZODRIN VENT
- 1 1/2" CHLOROFORM
- 1/2" INSTRUMENT AIR
- 2- 1" AIR
- 2" PROCESS
- 1" NATURAL GAS
- 2" ACETONE
- 2" CHLORINE
- 1" PROCESS
- 2" BRINE
- 2" PROCESS
- 2- 1 1/2" DK
- 2" MMA
- 1 1/2" MMA
- 1 1/2" UREA
- 1" CHLORINE
- 1" NITROGEN
- 1 1/2" SULFUR DIOXIDE
- 1" PROCESS
- 1 1/2" AMMONIA
- 1 1/2" CHLORINE
- 2- 2" BRINE
- 2" CONDENSATE
- 4" PROCESS VENT
- 2" AIR
- 4" CHEMICAL SEWER
- 2" CAUSTIC
- 4" CAUSTIC
- 1 1/2" UREA
- 1 1/2" BREATHABLE AIR
- 2" ACETONE
- 4" CHEMICAL SEWER
- 4" UTILITY AIR
- 4" CONDENSATE
- 2" RAFFINATE
- 4" TMP

J66
- 1" NITROGEN
- 2" TMP VENT
- 2" TMP
- 1" NITROGEN
- 1 1/2" AIR
- 1/2" BREATHABLE AIR
- 1 1/2" NATURAL GAS
- 2" NATURAL GAS
- 3" BRINE
- 4" BRINE
- 4" STEAM
- 1" AIR
- 4" STEAM
- 1 1/2" CONDENSATE

J67
- 2 -3" BRINE
- 1" STEAM
- 1" NITROGEN
- 1 1/2" AIR

J68
- 2" PIPE

J69
- 2- 1" PIPE
- 2- 1 1/2" PIPE

J72
- 2- 2" PIPE

AE1
- 4" STEAM
- 2" AIR

N

0 100 200

Scale 1" = 200'

NOTE: Nonagent, nonprocess piping is identified in RED text.

JACOBS ENGINEERING GROUP INC.

Prepared by Dp Associates

3-5
oduction Area
ommerce City, Colorado

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3.5 SHOP AREA

The Shop Area is located 1,400 feet east of D Street and 700 feet south of December 7th Avenue. The structures in this area served as maintenance, storage, and utility facilities and are shown in Figure 3-6. This area contains exterior piping, USTs, ASTs, and equipment that will be evaluated for removal.

The piping in this area distributed utilities: air, water, condensate, gasoline, and steam. One section of a line carried unknown constituents. The location of the piping is illustrated in Figure 3-6.

There are two USTs located in the Shop Area. They are both sumps with known contents of steam condensate and waste/decontamination water. The sumps are listed in Table 3-14.

The eight ASTs in this area were used to store gasoline, benzol, possibly dicyclopentadiene, degreasing solvents, and paint stripping solvent (Table 3-15). The samples 751(001-005) were taken from the degreasing tanks in Building 751. The analytical results presented in Table 3-16 show analytes with concentrations above the detection limits. This data was rejected by the PMRMA Laboratory Support Division because of contract laboratory quality control deficiencies (Appendix C); therefore, the tanks must be sampled before removal.

Buildings 731 and 732 contain all the equipment that will be removed from the Shop Area. The historical contaminants associated with these buildings are listed in Table 3-17. The list is extensive because Building 732 was used as a warehouse. The

equipment identified for removal is presented in Table 3-18. For this equipment, the contamination of concern is mainly surficial dust and residuals.

The contaminants of concern for the Shop Area are those associated with the structures functioning as maintenance, storage, and utility facilities. Mercury or mercury-containing equipment was identified in Buildings 542, 543, and 543B. ACM was found in all of the structures except Building 552. No PCB-containing transformers were located in this area.

3.6 PRODUCTION SUPPORT AREA

The Production Support Area is immediately east of D Street between the first and second rail line (Figure 3-7). The buildings in this area consist of laundry facilities and a laboratory (Table 3-19). External piping, USTs, and equipment in this area will be evaluated for removal.

The pipelines in this area distributed utilities and process components. The utility pipelines carried steam, water, and air. Process components in the pipelines were identified as chlorine, sulfur dioxide, Sniff, and spent acid.

The two USTs in the Production Support Area are listed in Table 3-20. One of the USTs is associated with the steam system and the other is associated with the chemical sewer system. There are no ASTs in this area.

Table 3-21 identifies the equipment for removal from the structures in the Production Support Area. Most of the equipment comes from the laundry facility (Building 314) and the laboratory (Building 313). The laboratory is separated into agent and

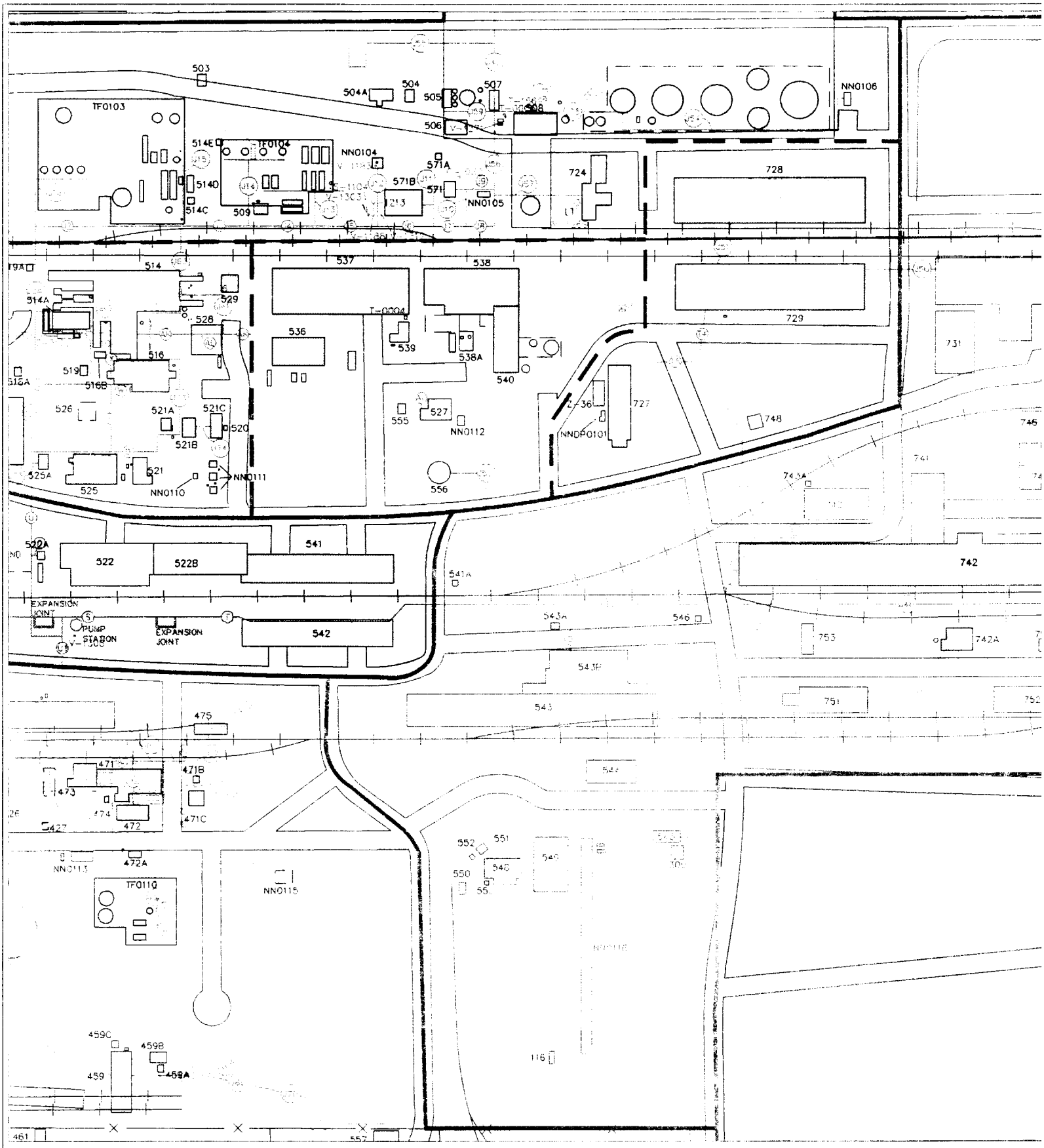


Figure
Shop A
Rocky Mountain Arsenal, C

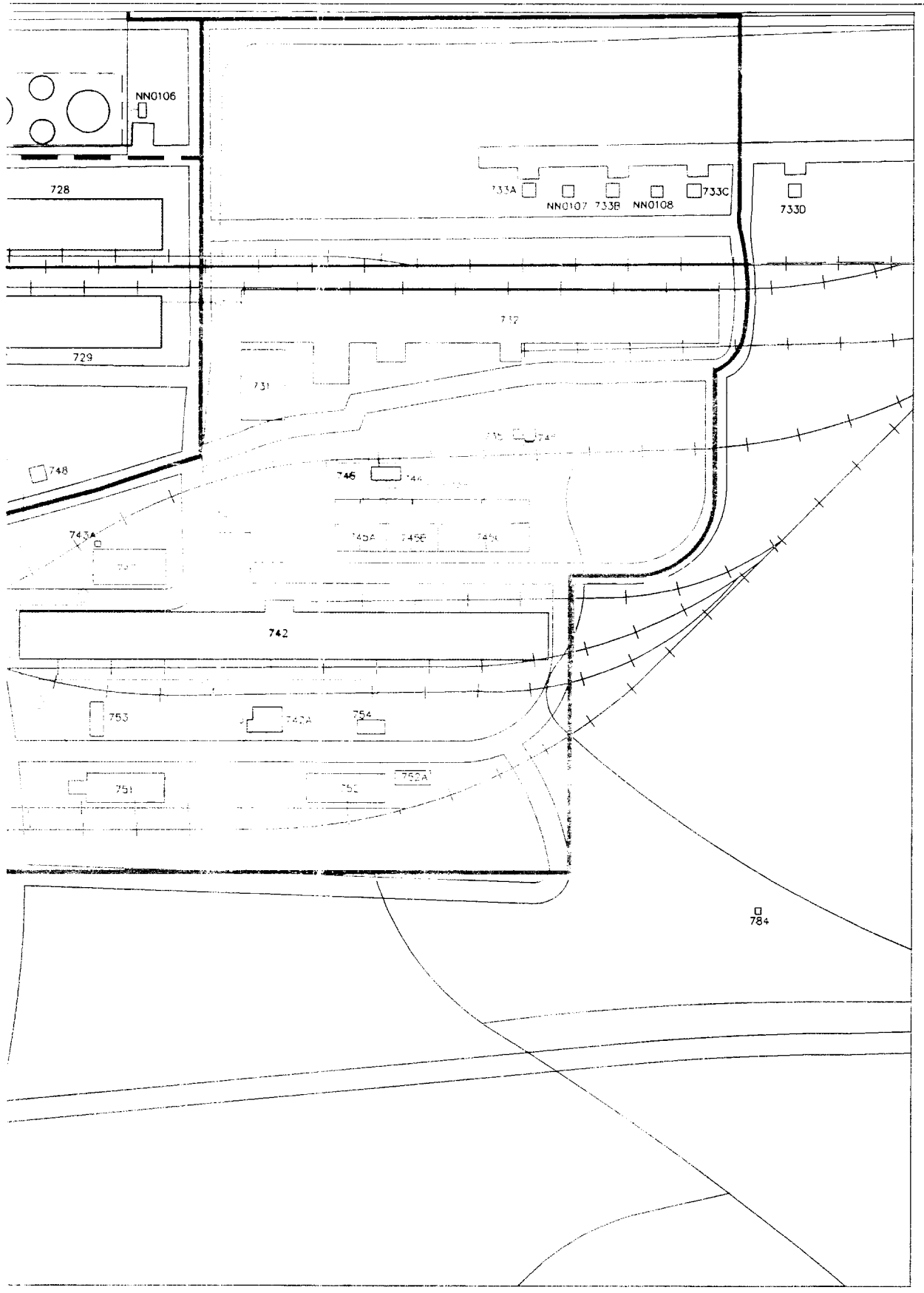
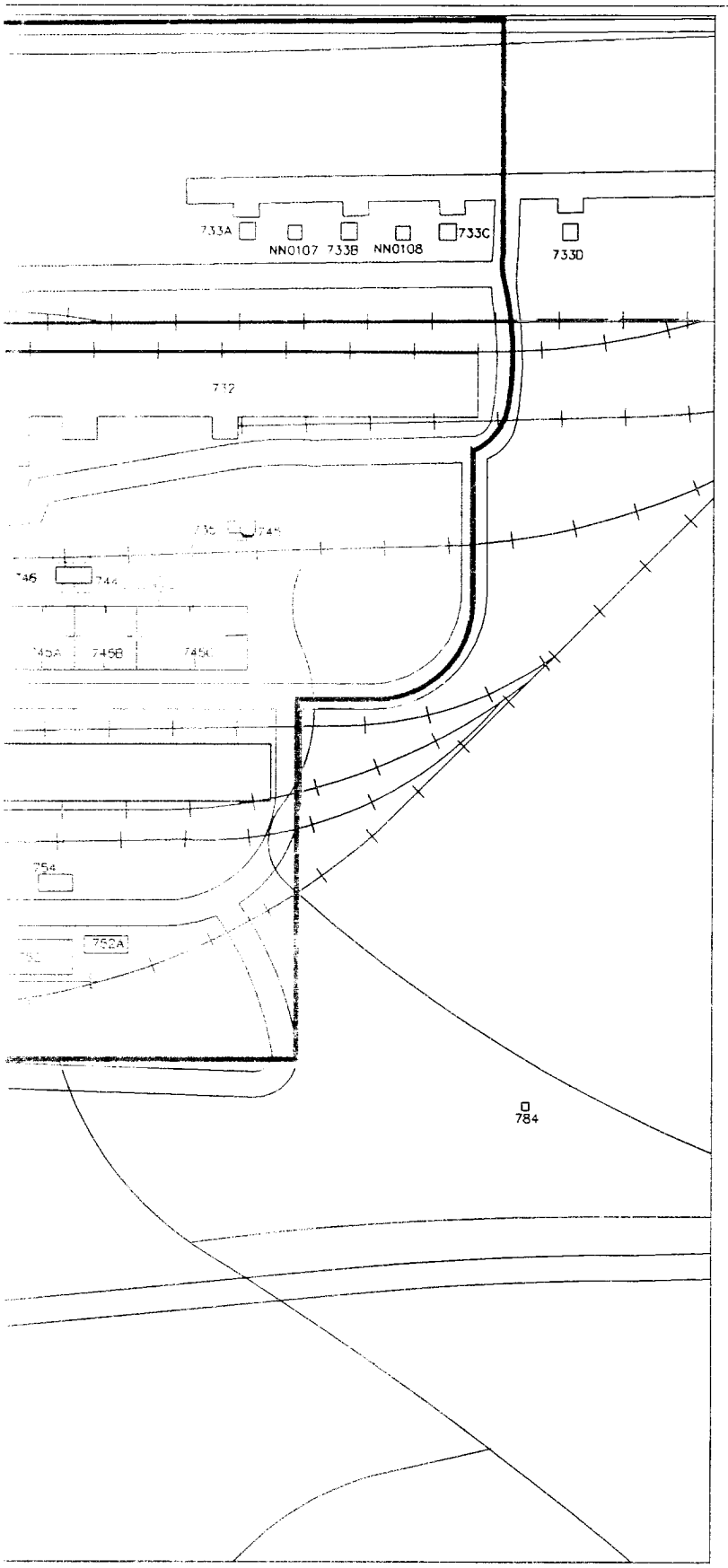


Figure 3–6
Shop Area
Mountain Arsenal, Commerce City, Colorado



LEGEND

- Buildings Owned by Shell
- Nonagent Buildings Leased by Shell
- Agent Buildings Leased by Shell
- Agent Buildings
- Underground Storage Tanks for Removal
- Aboveground Storage Tanks for Removal

N

0 100 200

Scale 1" = 200'

NOTE Nonagent, nonprocess piping is identified in text.

3-6
Area
Commerce City, Colorado

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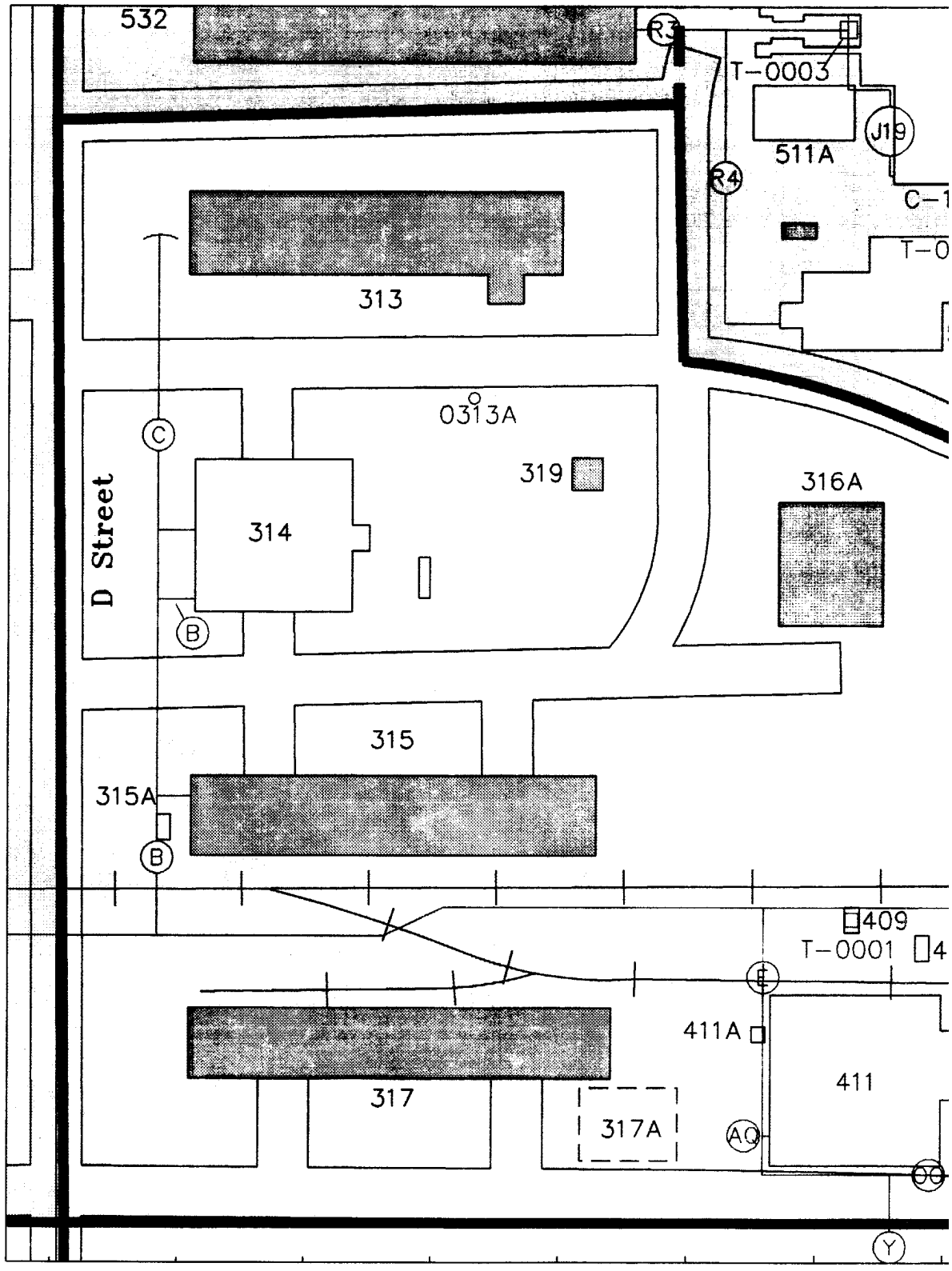
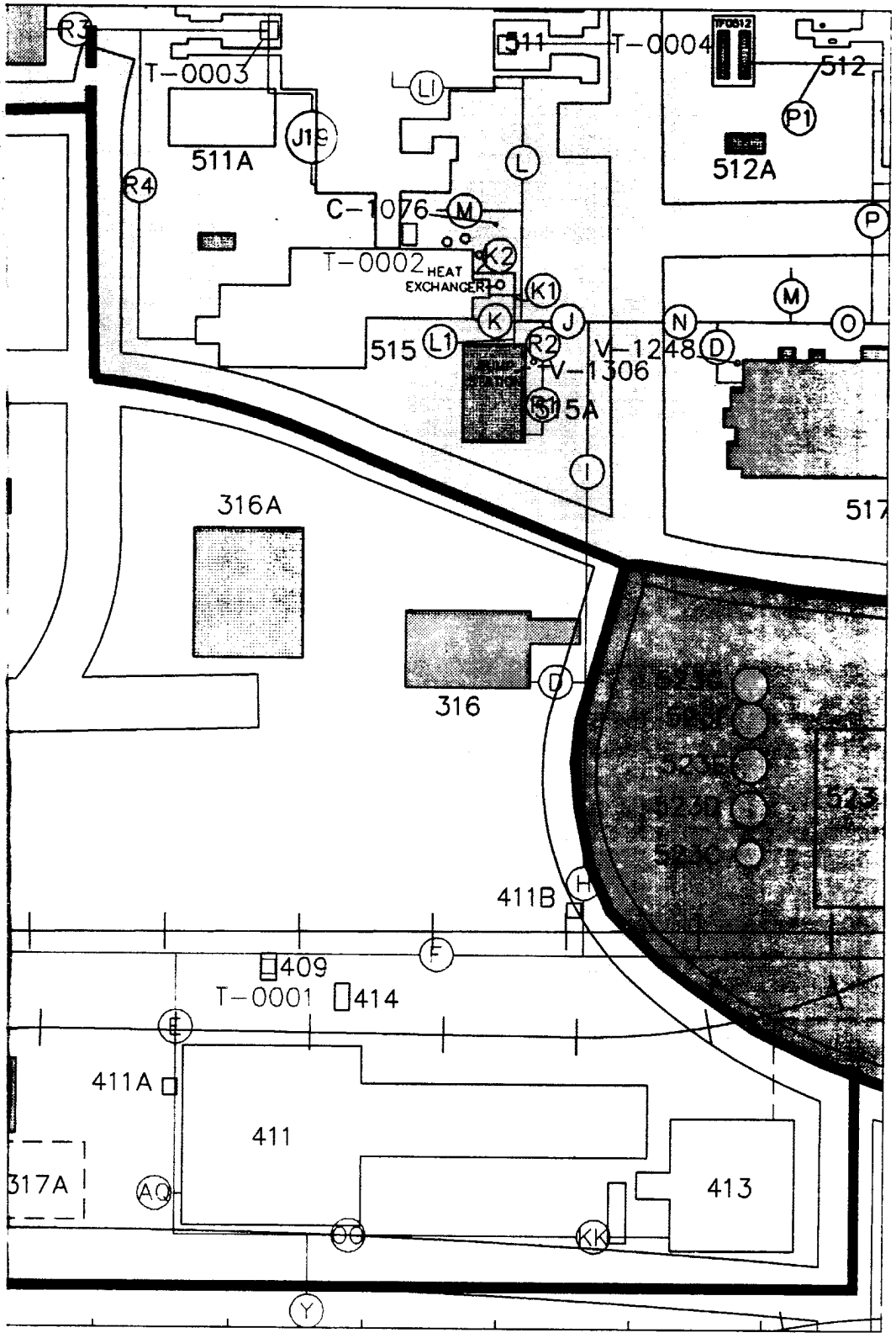


LEGEND

- Buildings Owned by Shell
- Nonagent Buildings Leased by Shell
- Agent Buildings Leased by Shell
- Agent Buildings
- Underground Storage Tanks for Removal
- Aboveground Storage Tanks for Removal

Figure
Production Su
Rocky Mountain Arsenal, C



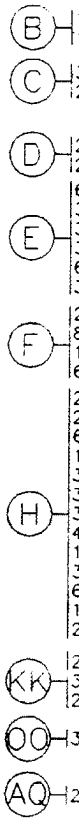


Figure 3-7
Production Support Area
)untain Arsenal, Commerce City, Colorado

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Sc

NOTE: Nonagent, nonprocess pipi
in RED text.

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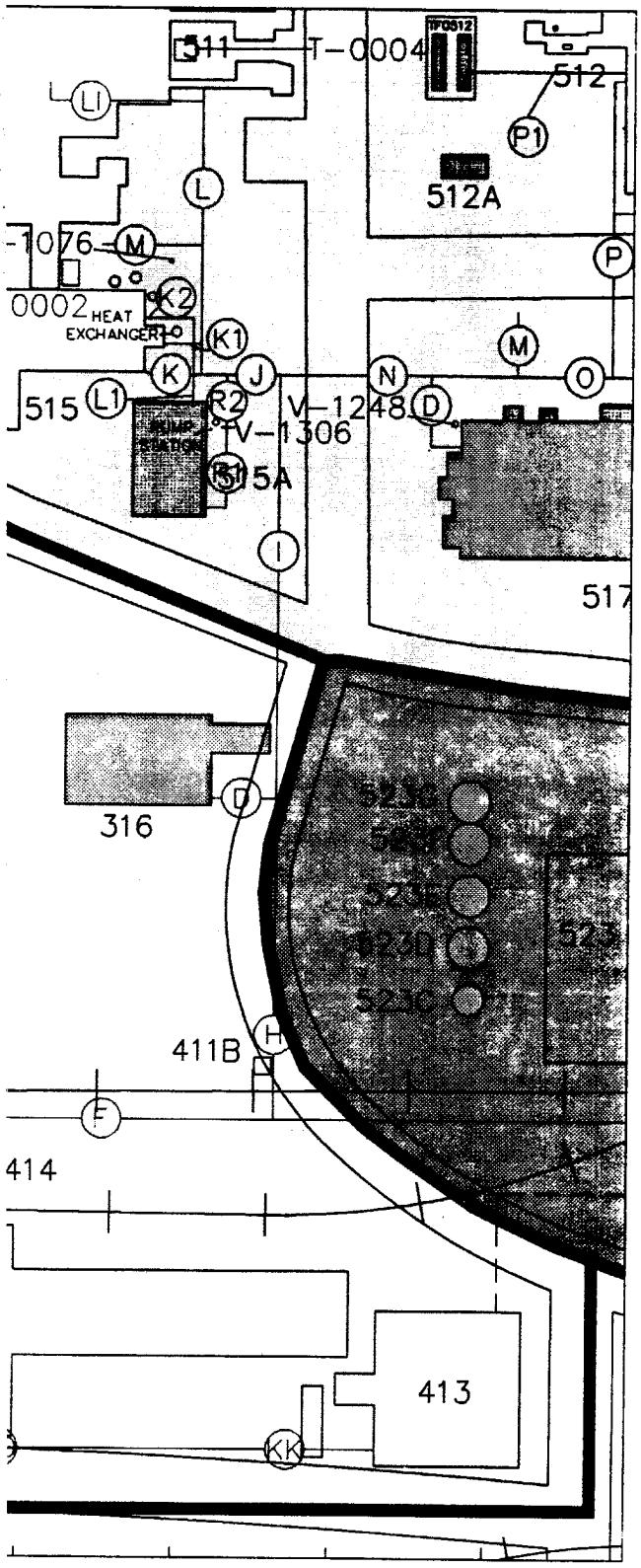

B — 1 1/2" STEAM; 1" AIR

C — 3" STEAM; 2" CONDENSATE

D — 2" STEAM; 2" CONDENSATE

E — 6" CHLORINE; 3" CAUSTIC, STEAM TRACED; 3" CHLORINE; 3" SNIFF; 6" STEAM; 3" CONDENSATE

F — 2" NATURAL GAS; 8" CONDENSATE; 14" STEAM; 6" AIR

H — 2" BREATHABLE AIR; 2" NATURAL GAS; 6" CHLORINE; 1 1/2" PIPE; 3" CHLORINE VAPOR; 3" STEAM; 3" CONDENSATE; 4" PLANT AIR; 1 1/2" STEAM; 3" CONDENSATE; 6" STEAM; 1 1/2" AIR; 2" SPENT ACID

KK — 2-3" SM; 3" STEAM; 2" CONDENSATE

OO — 3" SD

AQ — 2" STEAM

N

0 45 90

Scale 1" = 90'

3-7

upport Area

Commerce City, Colorado

NOTE: Nonagent, nonprocess piping is identified in RED text.

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nonagent sections by a secured door. The nonagent portion of the building is in the scope of this document but the agent portion of the building will be handled under the agent CPRA-IRA. Any work in this building will need to be coordinated with other programs to avoid scheduling conflicts. The list of historical contaminants (Table 3-19) associated with the buildings in this area is extensive because of the support functions these structures provided to the RMA.

The contaminants of concern for the Production Support Area include those associated with the functions of the structures and the surficial soils and residues potentially contaminating the piping and equipment.

3.7 NORTHERN TIER PRODUCTION AREA

The Northern Tier Production Area is located east of D Street and straddles the first rail line. A variety of chemicals were manufactured in the structures located in this area. This area is also the location of the Denver Effluent Treatment (DET) facility. All except three structures in this area are included in the Shell-only response actions or are part of the agent work element. The three structures addressed in this document are listed in Table 3-22. No historical information for these structures is available; therefore, characterization before removal is necessary. Piping, USTs, ASTs, and equipment associated with these structures will be considered for removal.

The pipelines in the Northern Tier Production Area distributed a wide range of chemicals for the chemical processes that these structures supported. The past contents of the pipelines are shown in Figures 3-8A and 3-8B. A number of the piperuns are associated with agent facilities and will be sampled. If the results from

the sampling indicate agent contamination, the pipelines will be removed under the agent CPRA-IRA.

In the Northern Tier Production Area, pipelines in the DET facility were sampled. The lines sampled were of unknown use or associated with the chemical sewer. The most common analytes were ICP metals, which are also common throughout the South Plants Area. Methylene chloride, aldrin, and dieldrin are the next most common analytes. Table 3-23 lists the samples that had analytes above the detection limit.

Fourteen USTs remain in the Northern Tier Production Area that are addressed in this document. Most of the USTs contained spent acid and chemical sewage. Four of the USTs are metering pump vaults. Table 3-24 lists the USTs identified for removal from this area.

Twenty-three ASTs are located in this area. The majority of tanks contain unknown substances and must be sampled before removal. The ASTs in the Northern Tier Production Area are listed in Table 3-25.

The equipment identified for removal in the Northern Tier Production Area is listed in Table 3-26 and is contained in two of the three structures that are addressed in this document. The quantity of equipment identified for removal is small, with the majority remaining in Building 539.

The contaminants of concern for the Northern Tier Production Area are those associated with the production of pesticides. The pipelines and USTs with unknown contents must be characterized before removal. The chemical sewer lines also

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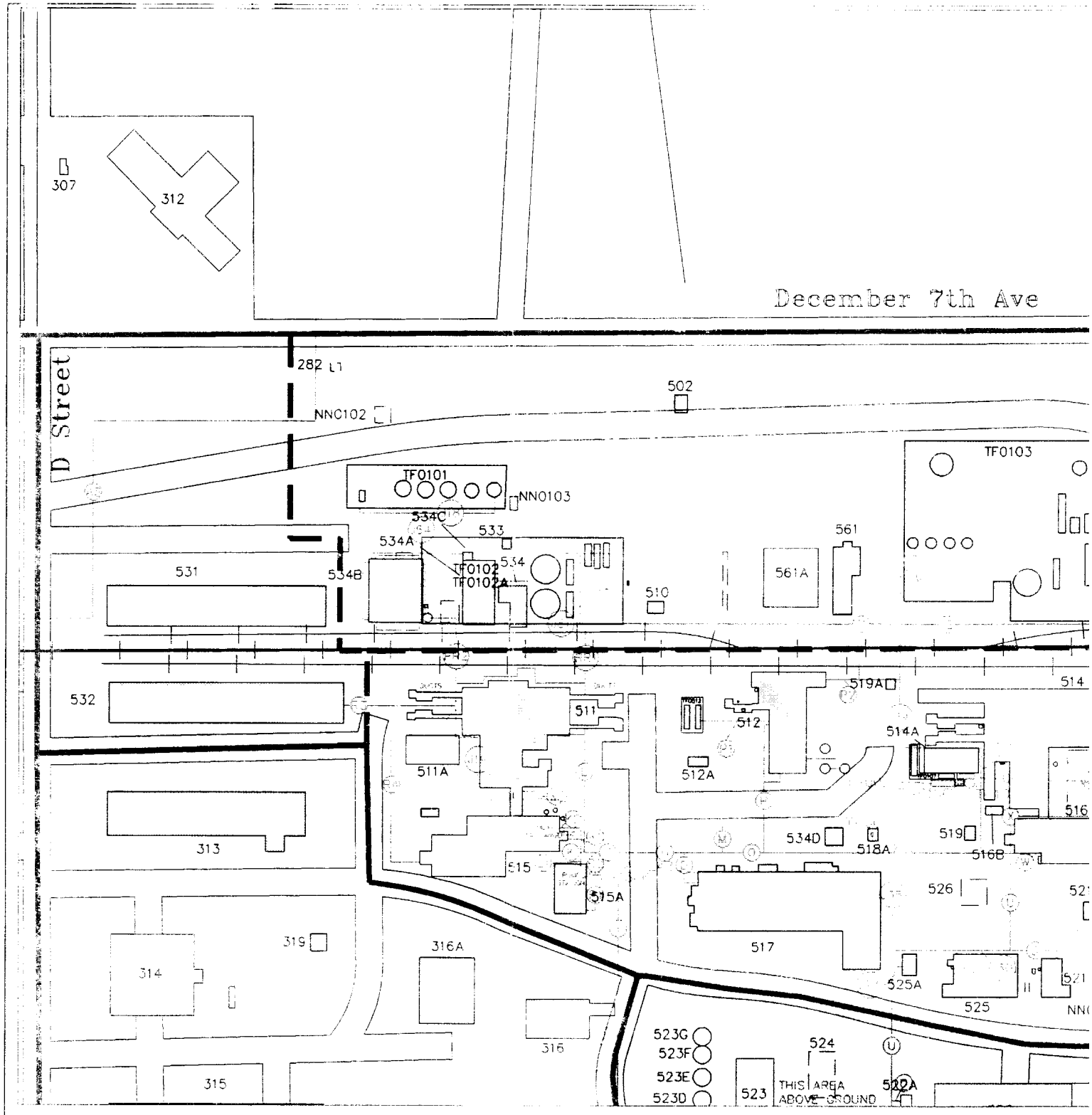

Figure 3-8A
Northern Tier Produc
Rocky Mountain Arsenal, Comm

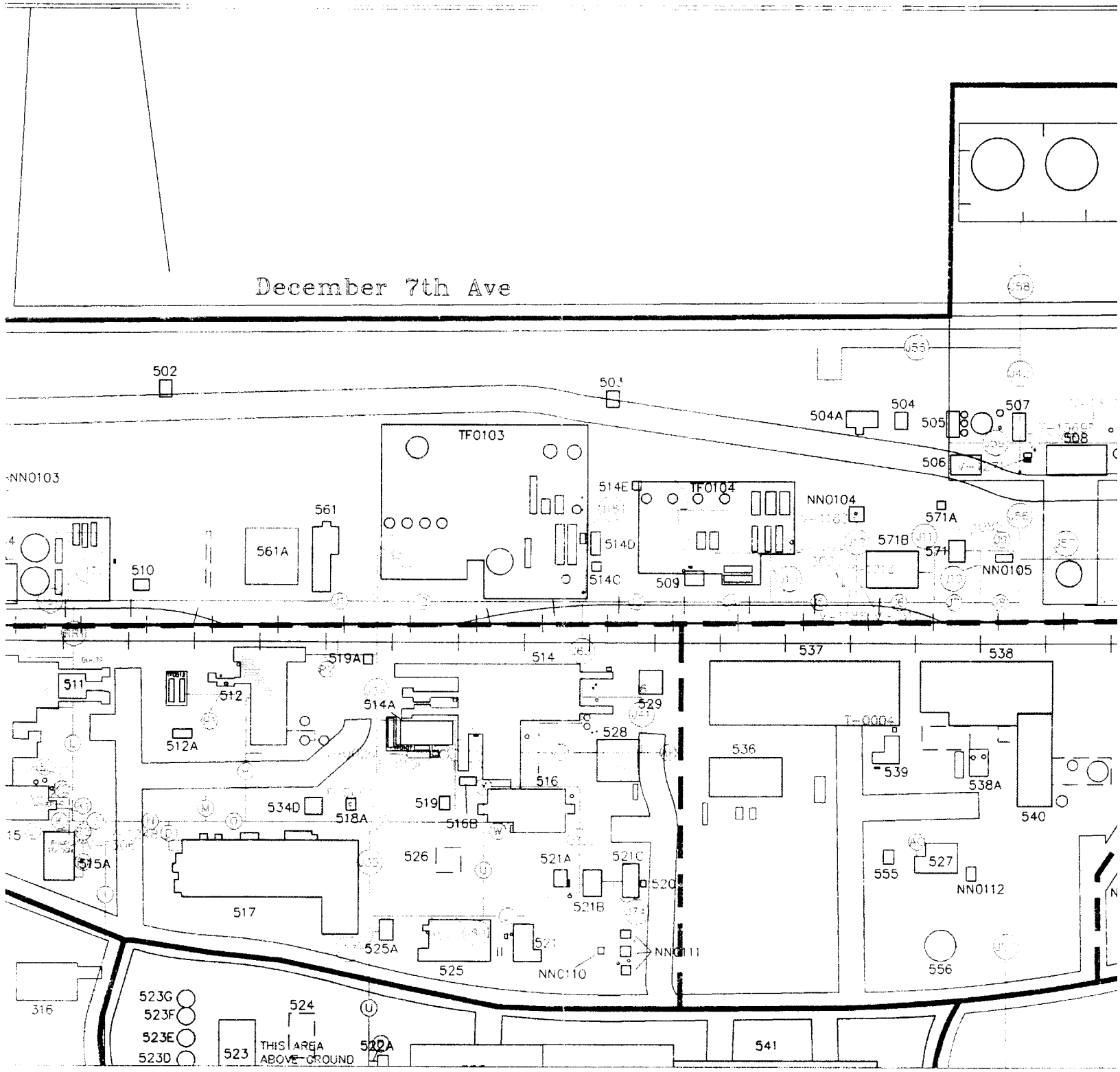

Figure 3–8A
Northern Tier Production Area
Rocky Mountain Arsenal, Commerce City, Colorado

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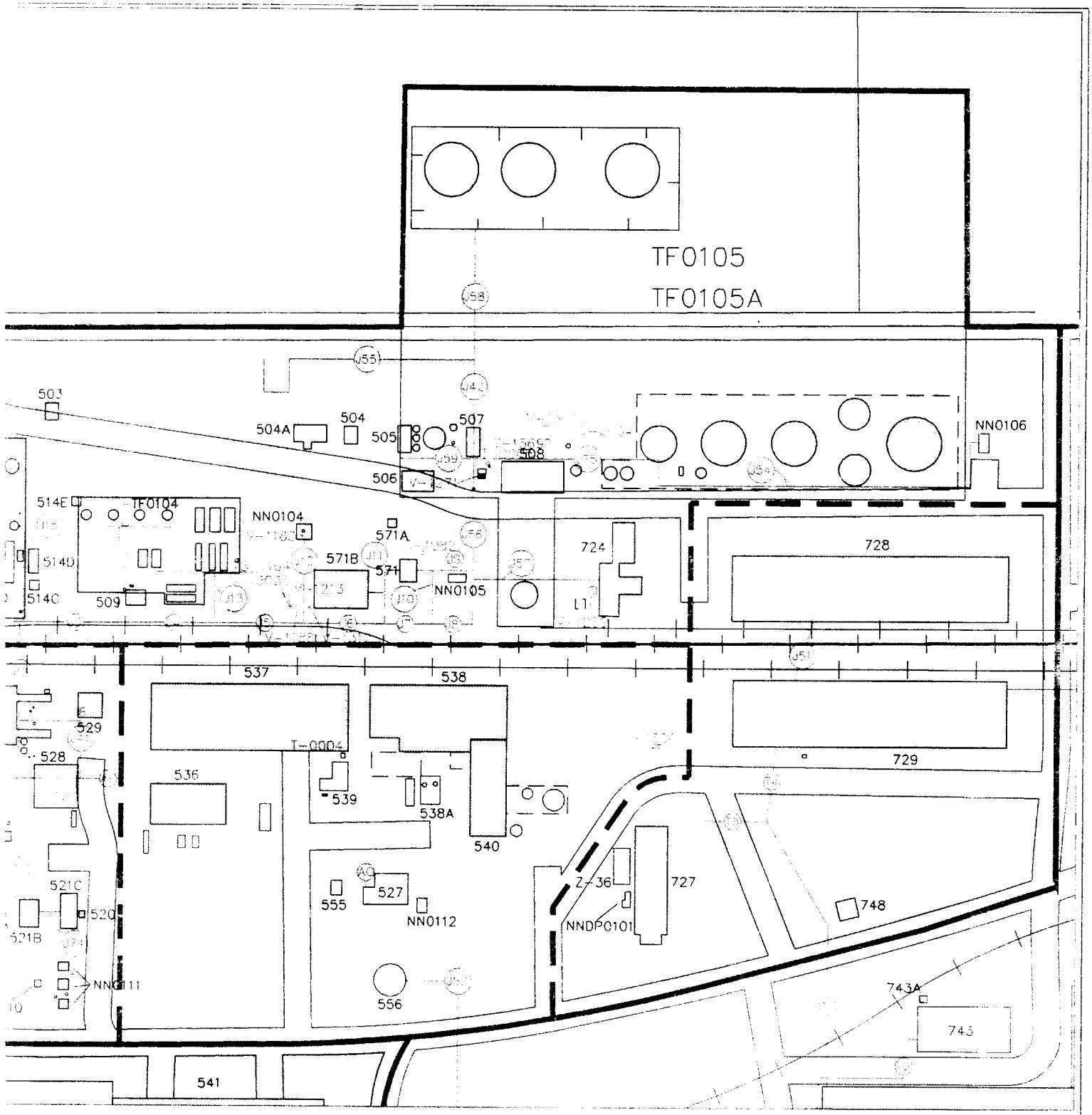
Scale 1" = 150'



Note: For Pipe Discriptions See Figure 3-8B

ion Area
erce City, Colorado

0 75 150
Scale 1" = 150'

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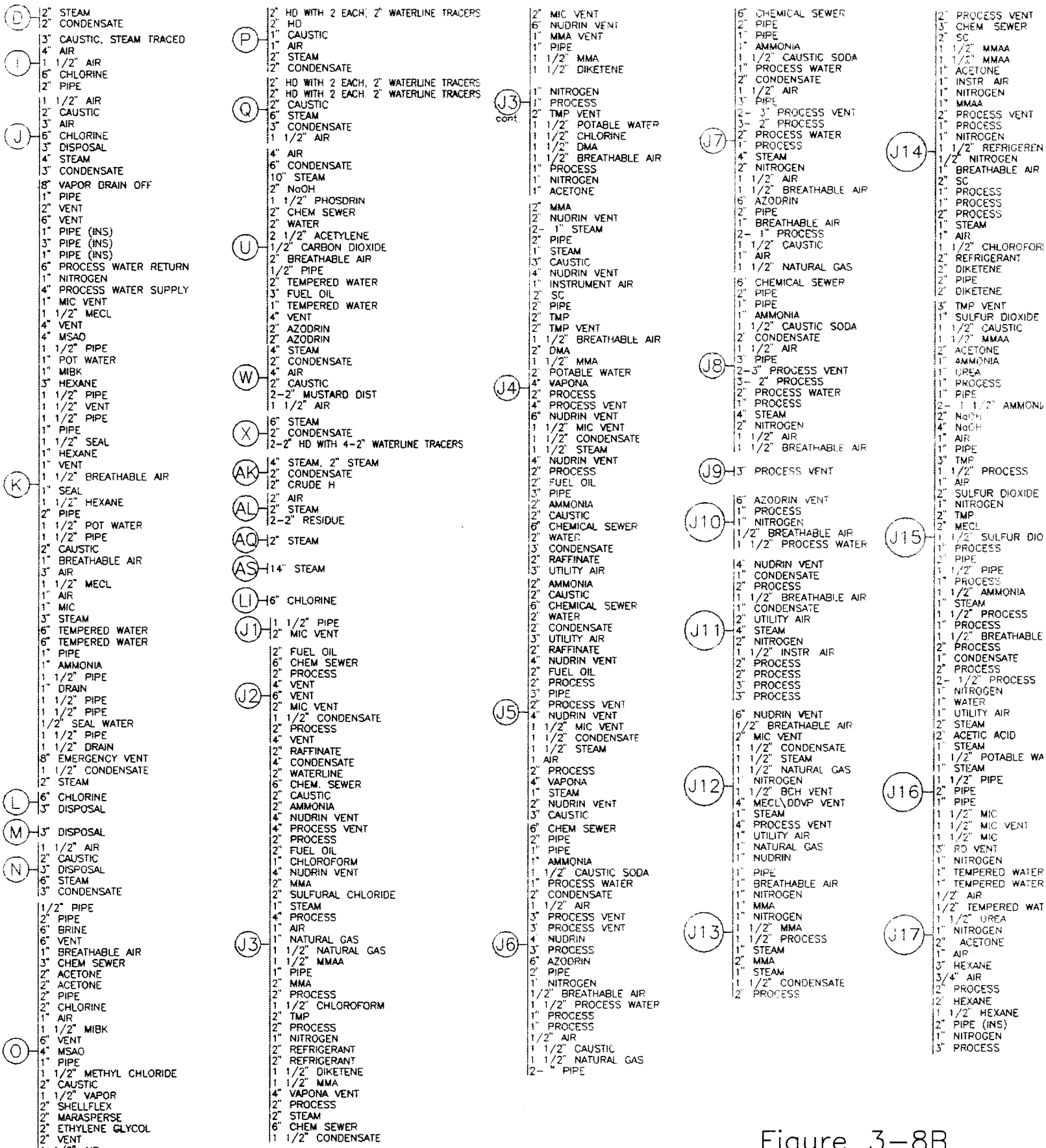
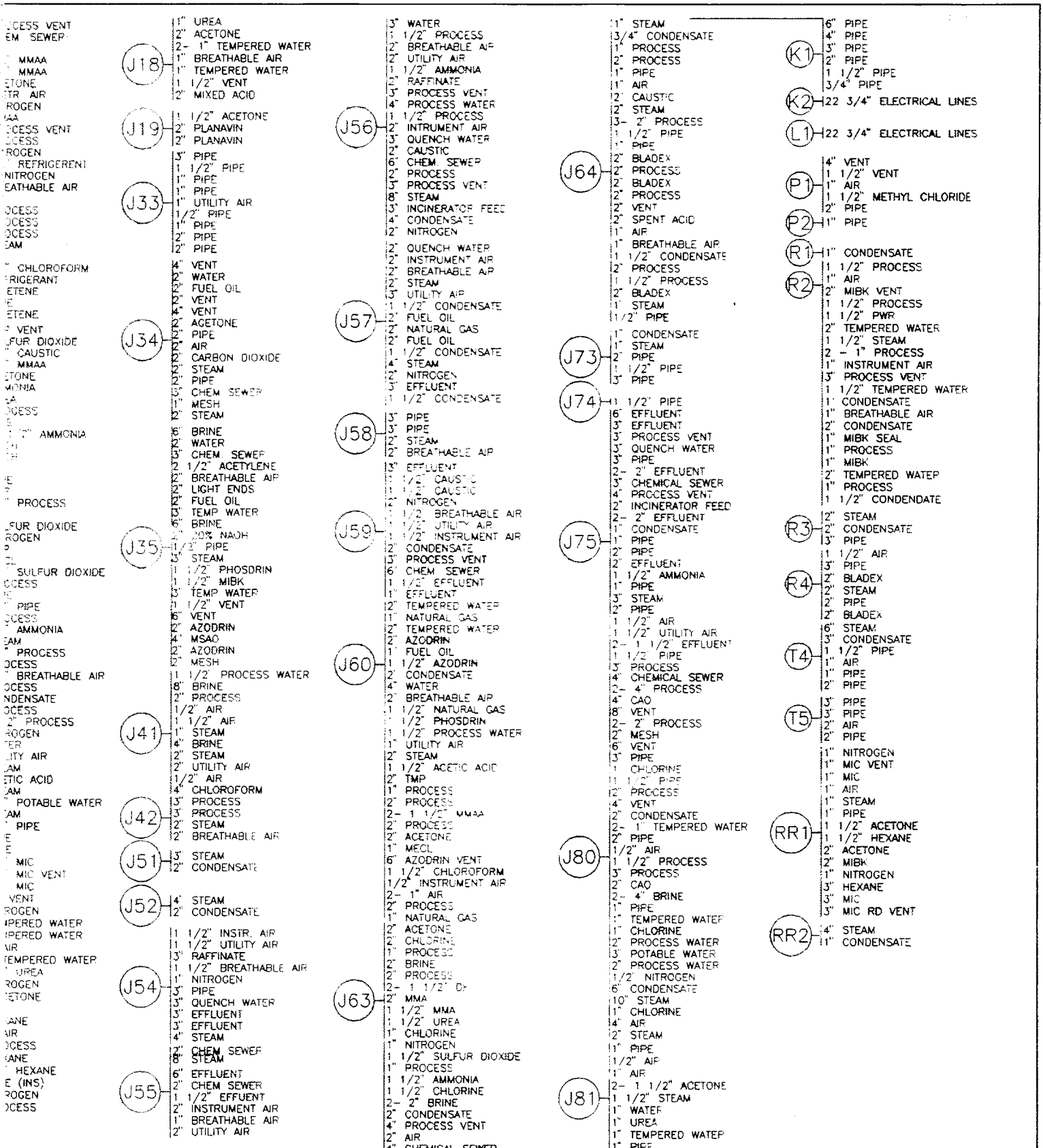


NOTE: Nonagent, nonprocess piping is identified in RED text.

Figure 3-8B

Northern Tier Production Area

Rocky Mountain Arsenal, Commerce C



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present special concerns because any of the chemicals used in this area may have entered these lines at some time.

3.8 SHELL OIL COMPANY

Thirty-nine Shell buildings were surveyed for this document. The structures are located in the Northern Tier Production, Southern Tier Production, and Chlorine Plant/Brine/Utility Service areas. (See Figure 3-1 for locations of the structures.) Table 3-27 lists the buildings and provides historical contaminant information. Shell has performed PCB sampling in these areas and has not detected any PCBs. Although these structures are not detailed for decontamination and removal actions of equipment, piping, tanks, and conduit, information gathered during the survey and inventory phase for this document is provided in the following paragraphs. Shell is not required to perform any removal, decontamination, or disposal action pursuant to this work element of the IRA. However, Shell does have the option of following plans set forth in this Consolidated Implementation Document, developing their own removal plans, or implementing the plans contained in the ROD when it is issued.

The Shell buildings in the South Plants Area contain a greater quantity of process equipment than the Army structures. The production lines appear to be still intact in several of the buildings. Table 3-28 lists the equipment that was located in the buildings at the time of the survey.

Also located in these structures are 68 ASTs. Table 3-29 lists each of the tanks and gives a description of the last-known contents. The last contents of many of these tanks are unknown.

The types of contamination that are likely to be found in the Shell buildings are those associated with the production of pesticides, as well as contamination in the dust that has accumulated over the years.

3.9 SOUTH PLANTS INVENTORY SUMMARY

The seven areas described in the previous sections will be used to summarize the general equipment, piping, conduit, and tanks inventory data. These areas represent distinct operational zones within the South Plants Area. The following sections summarize the inventory data for these operational zones.

3.9.1 Chlorine Plant/Brine/Utility Service Area

The Chlorine Plant/Brine/Utility Service Area has nine substations and the primary electrical substation that provide electricity. Approximately 30 non-PCB transformers and rectifiers are in this area. The Chlorine Plant/Brine/Utility Service Area contains approximately 5,400 lineal feet of pipe runs; of that, 3,600 feet are utility lines (steam, condensate, water, air, nitrogen, natural gas, and carbon dioxide), 400 feet are known process lines, and 1,400 feet are unknown process lines. The Chlorine Plant/Brine/Utility Service Area also contains approximately 2,500 lineal feet of electrical conduit. The Chlorine Plant/Brine/Utility Service Area also contains two concrete USTs. One tank is a sump, and one is a vault (Table 3-1). The last known contents were described as water and steam condensate. The Chlorine Plant/Brine/Utility Service Area also has six remaining ASTs (Table 3-2). All of these tanks are constructed of steel. Most of these tanks stored fuels for vehicles or the boilers located in Buildings 321 and 325. Five of the ASTs are

located outside. These tanks range in size from 188 to 72,000 gallons. The average volume (excluding the 72,000-gallon tank) is 433 gallons. The last known contents of the 72,000-gallon tank are listed as road oil, waste oil, and No. 6 bunker fuel; the other tanks hold gasoline and water.

3.9.2 Warehouse Area

The Warehouse Area contains a series of 10 substations and 900 lineal feet of electrical conduit that provide electricity. Twenty-nine non-PCB transformers and rectifiers are associated with these substations. The Warehouse Area contains 15,000 lineal feet of utility pipeline, 1,200 feet of known process line, and 20 feet of unknown process line for a total of 16,220 lineal feet of pipe. The Warehouse Area also contains nine ASTs (Table 3-5). Six of these tanks are concrete, and three are listed as steel. Seven of the tanks are located within a structure. Most of the tanks were associated with Building 328 and the Goop mixing and filling activity. These tanks range in size from 16 to 1,800 gallons volumetric capacity. The average volume is 977 gallons.

3.9.3 White Phosphorus Area

The inventory for the White Phosphorus Area is limited to Building 542. There are only four small- to medium-sized heaters in the building, which have limited salvage value. Based on this inventory information, it is recommended that the removal of all piping, equipment, and tanks in the White Phosphorus Area be handled as part of agent CPRA-IRA. This includes the heaters in Building 542. The dismantlement and removal section will also reflect this recommendation.

3.9.4 Southern Tier Production Area

Power is supplied to the Southern Tier Production Area through a series of five substations and 29,000 lineal feet of electrical conduit. Fifteen non-PCB transformers and rectifiers are in this area. The Southern Tier Production Area has approximately 41,000 lineal feet of piping of which 17,000 feet are known process lines, 15,000 feet are utility lines, and 9,000 feet are unknown process lines. The Southern Tier Production Area also contains about 300 feet of chemical sewer lines.

Six concrete USTs are in the Southern Tier Production Area. The tanks were used in a variety of production-related processes and range from 564 to 2,200 gallons in capacity. The average of the known capacities is 1,087 gallons. The Southern Tier also contains 15 steel ASTs, one concrete AST, one nickel AST, one stainless-steel AST, and one of unknown material. These tanks were used in a variety of processes and range from 53 to 10,000 gallons in capacity. The average capacity of the tanks is 2,732 gallons.

3.9.5 Shop Area

The Shop Area has a series of five substations and 1,000 lineal feet of electrical conduit. The Shop Area has a total of 7,000 lineal feet of piping of which 700 feet are known process pipes, 6,000 feet of various utility lines, and 400 feet of unknown process lines. The Shop Area contains two concrete sumps listed in the USTs database: one is a sewage pumping station, and the other is associated with the laboratory building. Both sumps are located outside of structures. The capacity of these tanks is unknown. Eight steel ASTs are located in the Shop Area. These

tanks stored mainly fuels and solvents used in the Shop Area. These tanks range in size from 53 to 500,000 gallons capacity. The average capacity is 62,800 gallons.

3.9.6 Production Support Area

The Production Support Area is serviced by 10 substations and 2,000 lineal feet of electrical conduit. This area has 21 non-PCB transformers and rectifiers. In this area, 8,000 lineal feet of pipeline are provided of which 2,000 feet are known process lines and 200 feet are unknown process lines. Two concrete sumps in the Production Support Area are listed on the USTs database. One is listed as a condensate pump house, and the other is listed as a chemical sewer pump. The condensate pump in the condensate pump house is approximately 1,850 gallons, and the chemical sewer pump is 3,100 gallons in capacity. No ASTs in the Production Support Area are listed in the ASTs database.

3.9.7 Northern Tier Production Area

The Northern Tier Production Area is serviced by 27 substations and 152,000 lineal feet of electrical conduit. This area has about 119,000 lineal feet of piping of which 48,000 feet are known process lines, 41,000 feet are utility lines, and 30,000 feet are unknown process lines. Also, 3,700 feet of chemical sewer are present.

Fourteen USTs remain in the Northern Tier Production Area. Four of these USTs are concrete metering pump vaults associated with the DET system. Nine of these tanks are concrete vaults and four are steel tanks. One tank's construction material is unknown and is located north of T1514. All of the tanks are located outside of structures. The capacity of the tanks ranges from 500 to 10,000 gallons, and the

average tank volume is 3,808 gallons. Most of these tanks were used for effluent, runoff, and process overflows from tank farms and associated production areas.

The Northern Tier Production Area also contains 28 ASTs. Five of these ASTs were associated with the DET system in an unknown manner. Fourteen of the tanks are steel and located outside of buildings. Four tanks are plastic and are within structures. The last five ASTs are stainless steel, fiberglass, and carbon steel. The tanks range in size from 53 to 15,900 gallons, and the average tank volume is 1,582 gallons.

TABLE 3-1
UNDERGROUND STORAGE TANKS IN THE SOUTH PLANTS
CHLORINE PLANT/BRINE/UTILITY SERVICE AREA
ROCKY MOUNTAIN ARSENAL

BPRE	BLDG	TPRE	TANK	FACILITY	LOCATION	SHELL	TYPE	CAPACITY (GAL)	ST_MATERIAL	LAST-KNOWN CONTENTS
	0248		0248J	BRINE TREATMENT PLANT-FOUNDATION	TANK IS LOCATED IN NORTHWEST CORNER OF FOUNDATION 248	N	UST	~1,000	CONCRETE	RUSTY COLORED FLUID - PROBABLY WATER
	0251	T	0001	CHLORINE EVAPORATOR/STORAGE	BLDG 251 IS LOCATED EAST OF BLDG 247 AND NORTH OF BLDG 321	N	UST/SUMP	6,872	CONCRETE	CONDENSATE, WATER

Notes:
BLDG = building
BPRE = building prefix
GAL = gallons
N = no
T = tank
TPRE = tank prefix
UST = underground storage tank
ST_MATERIAL = structural material

TABLE 3-2
ABOVEGROUND STORAGE TANKS IN THE SOUTH PLANTS
CHLORINE PLANT/BRINE/UTILITY SERVICE AREA
ROCKY MOUNTAIN ARSENAL

BPRE	BLDG	TPRE	TANK	FACILITY	LAST KNOWN CONTENTS	SHELL	IN-OUT	TYPE	CAPACITY (GAL)	ST_MATERIAL
	0321A		0321A	TANK	ROAD OIL, WASTE OIL, #6 BUNKER	N	OUTSIDE	AST	72,000	STEEL
	0321E	T	0001	INA	UNLEADED GAS	N	OUTSIDE	AST	264	STEEL
	0321E	T	0002	INA	REGULAR GAS	N	OUTSIDE	AST	264	STEEL
	0325	T	1017	ELECTRICAL POWER PLANT	PROBABLY WATER	N	OUTSIDE	AST	420	STEEL
	0325	T	1448	ELECTRICAL POWER PLANT	WATER	N	OUTSIDE	AST	1,027	STEEL
NN	0205	T	0001	INA	PROBABLY WATER	N	INSIDE	AST	188	STEEL

Notes:

AST = aboveground storage tank
BLDG = building
BPRE = building prefix
GAL = gallons
INA = information not available
N = no
NN = no number
T = tank
TPRE = tank prefix
ST_MATERIAL = structural material

TABLE 3-3
SALVAGEABLE EQUIPMENT IN THE SOUTH PLANTS AREA
CHLORINE PLANT/BRINE/UTILITY SERVICE AREA
ROCKY MOUNTAIN ARSENAL

BLDG	ITEM	QUANTITY	LOCATION	SHELL/ARMY	WEIGHT OF MATERIAL (LB)									Total Scrap Value ($)
					UNSAL	CU	STLES	CST	CAST	AL	HAST	TITAN	NICK	
0213	1 MILLION VOLT X RAY	1		ARMY	0	0	0	4000	0	0	0	0	0	44.00
0213	250,000 VOLT X RAY	1		ARMY	0	0	0	2000	0	0	0	0	0	22.00
0213	HEATERS	4		ARMY	0	0	0	400	0	0	0	0	0	4.40
0213	HOOD	1		ARMY	0	0	0	100	0	0	0	0	0	1.10
0213	SPACE HEATER	1		ARMY	0	0	0	75	0	0	0	0	0	0.83
0213	TROUGH 47.5X7X6 (lead?)	2		ARMY	0	0	0	200	0	0	0	0	0	2.20
0213	TROUGH 48X7X6 (lead?)	1		ARMY	0	0	0	100	0	0	0	0	0	1.10
0321C	MOTORS	2		ARMY	0	0	0	600	0	0	0	0	0	6.60
0321C	ROTARY PUMPS	2		ARMY	0	0	0	300	0	0	0	0	0	3.30
0321D	MOTORS, 10 HP	2		ARMY	0	0	0	300	0	0	0	0	0	3.30
0321D	PUMPS	3		ARMY	0	0	0	450	0	0	0	0	0	4.95
0321D	TANK, 700 GAL	1		ARMY	0	0	0	1000	0	0	0	0	0	11.00
NN0205	MOTOR	1		ARMY	0	0	0	200	0	0	0	0	0	2.20

Notes:
- AL = aluminum weight
- BLDG = building
- CAST = cast iron
- CST = carbon steel
- CU = copper
- GAL = gallon
- HAST = hasteloy
- LB = pound
- NICK = nickel
- STLES = stainless
- TITAN = titanium
- UNSAL = unsalvageable
- ARMY = army equipment

TABLE 3-4
STRUCTURES IN THE SOUTH PLANTS
CHLORINE PLANT/BRINE/UTILITY SERVICE AREA
ROCKY MOUNTAIN ARSENAL

BUILDING	FACILITY	CONTAMINANTS	ASSOCIATED AST	ASSOCIATED UST	VOLUME OF EQUIPMENT EXISTING (yd^3)	VOLUME OF PIPING EXISTING (yd^3)	PCB TRANSFORMERS	MERCURY	ACM	PCB YTAG	PCB BTAG
0211	Gas Meter House	HISTORICAL: GB breakdown products (potential for contamination quite low (Task 24)), natural gas SAMPLING: Surficial soil (0-2 inches): aldrin, DDE, DDT, dieldrin, endrin, hexachlorocyclopentadiene	0	0	1	0	N	N	Y	NSP	NSP
0213	Calibration Facility/X-Ray Lab	HISTORICAL: film developer, fixer, wetting solutions	0	0	7	0	N	N	Y	0	30
0245	Substation Building	HISTORICAL: PCBs	0	0	1	0	N	N	Y	0	3
0321C	Pumphouse	HISTORICAL: fuel oil, natural gas	0	0	1	2	N	N	N	0	4
0321D	Fuel Oil Pumphouse	HISTORICAL: fluoranthene, fuel oil, methyl naphthalene, phenanthrene, pyrene	0	0	5	1	N	N	Y	2	2
0323	Ash (Coal) Storage Silo-Hopper	None	0	0	4	3	N	NS	Y	NSP	NSP

NOTES:

ACM = asbestos-containing material
AST = aboveground storage tank
BTAG = blue tag, <50ppm or < 10 µg/100 cm^2 or nondetect
cm^2 = square centimeters
DDE = 1,1-dichloro-2,2-bis(p-chlorophenyl)ethylene
DDT = dichlorodiphenyltrichloroethane
GB = isopropyl methylphosphonofluoridate
N = no
NS = Not sampled
NSP = no suspect PCB equipment
NSR = need sample results
PCB = polychlorinated biphenyl
PCB YTAG = # of pieces of equipment w/a YTAG
PCB BTAG = # of pieces of equipment w/a BTAG
ppm = parts per million
UST = underground storage tank
Y = yes
YTAG = yellow tag, >50ppm or > 10 µg/100 cm^2
yd^3 = cubic yards
µg = micrograms

TABLE 3-5
ABOVEGROUND STORAGE TANKS IN THE SOUTH PLANTS
WAREHOUSE AREA
ROCKY MOUNTAIN ARSENAL

BPRE	BLDG	TPRE	TANK	FACILITY	LAST-KNOWN CONTENTS	SHELL	IN-OUT	TYPE	CAPACITY (GAL)	ST_MATERIAL
	0328	T	0002	GOOP MIXING AND FILLING	MAGNESIUM DUST IN OIL/ASPHALT BASE, COARSE MAGNESIUM, SODIUM NITRATE, GASOLINE, VISCOUS PHENOL PETROLEUM EXTRACT, ISOBUTYL METHACRYLATE POLYMER, NAPALM	N	INSIDE	AST	1,800	CONCRETE
	0328	T	0003	GOOP MIXING AND FILLING	MAGNESIUM DUST IN OIL - ASPHALT BASE, COARSE MAGNESIUM, SODIUM NITRATE, GASOLINE, VISCOUS PHENOL PETROLEUM EXTRACT, ISOBUTYL METHACRYLATE POLYMER, NAPALM	N	INSIDE	AST	1,800	CONCRETE
	0328	T	0004	GOOP MIXING AND FILLING	MAGNESIUM DUST IN OIL - ASPHALT BASE, COARSE MAGNESIUM, SODIUM NITRATE, GASOLINE, VISCOUS PHENOL PETROLEUM EXTRACT, ISOBUTYL METHACRYLATE POLYMER, NAPALM	N	INSIDE	AST	1,800	CONCRETE
	0328	T	0005	GOOP MIXING AND FILLING	MAGNESIUM DUST IN OIL - ASPHALT BASE, COARSE MAGNESIUM, SODIUM NITRATE, GASOLINE, VISCOUS PHENOL PETROLEUM EXTRACT, ISOBUTYL METHACRYLATE POLYMER, NAPALM	N	INSIDE	AST	1,800	CONCRETE
	0328	T	0006	GOOP MIXING AND FILLING	UNKNOWN	N	INSIDE	AST	15.7	STEEL
	0341A	T	0001	CONDENSATE PUMPHOUSE	PROBABLY STEAM CONDENSATE	N	INSIDE	AST	220	STEEL
	0341A	T	0002	CONDENSATE PUMPHOUSE	STEAM CONDENSATE	N	INSIDE	AST	160	STEEL
	0362	T	0001	WAREHOUSE	UNKNOWN	N	OUTSIDE	AST	600	CONCRETE
	0362	T	0002	WAREHOUSE	PROBABLY WATER AND UNKNOWNS	N	OUTSIDE	AST	598	CONCRETE

Notes:

AST = aboveground storage tank
BLDG = building
BPRE = building prefix
GAL = gallons
N = no
ST_MATERIAL = structural material
T = tank
TPRE = tank prefix

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TABLE 3-6
SALVAGEABLE EQUIPMENT IN THE SOUTH PLANTS
WAREHOUSE AREA

BLDG	ITEM	QUANTITY	LOCATION	SHELL/ARMY	WEIGHT OF MATERIAL (LB)									Total Scrap Value ($)
					UNSAL	CU	STLES	CST	CAST	AL	HAST	TITAN	NICK	
0326	MOTOR, 150 HP	1		ARMY	0	0	0	2000	0	0	0	0	0	22
0326	PUMPS	2		ARMY	0	0	0	300	0	0	0	0	0	3.3
0329	MOTORS, 10 HP	4		ARMY	0	0	0	1200	0	0	0	0	0	13.2
0329	PUMPS	4		ARMY	0	0	0	600	0	0	0	0	0	6.6
0337	HOT WATER HEATER	1		ARMY	0	0	0	100	0	0	0	0	0	1.1
0341B	MOTOR, 5 HP	1		ARMY	0	0	0	100	0	0	0	0	0	1.1
0341B	PUMP	1		ARMY	0	0	0	50	0	0	0	0	0	0.55
0342	HEATERS	3		ARMY	0	0	0	600	0	0	0	0	0	6.6
0343	AC UNIT	1		ARMY	0	0	0	300	0	0	0	0	0	3.3
0343	CONVEYORS	2		ARMY	0	0	0	1000	0	0	0	0	0	11
0343	HEATERS	5		ARMY	0	0	0	1000	0	0	0	0	0	11
0344	HEATERS	4		ARMY	0	0	0	800	0	0	0	0	0	8.8
0344	RADIATOR	1		ARMY	0	0	0	100	0	0	0	0	0	1.1
0344	WATER HEATER	1		ARMY	0	0	0	300	0	0	0	0	0	3.3
0345	HEATERS	4		ARMY	0	0	0	800	0	0	0	0	0	8.8
0351	HEATER	2		ARMY	0	0	0	150	0	0	0	0	0	1.65
0351	MOTOR	2		ARMY	0	0	0	100	0	0	0	0	0	1.1
0351	WATER HEATER	1		ARMY	0	0	0	100	0	0	0	0	0	1.1
0354	HEATERS	5		ARMY	0	0	0	1000	0	0	0	0	0	11
0355	HEATERS	4		ARMY	0	0	0	800	0	0	0	0	0	8.8
0356	HEATER WITH DUCT WORK	1		ARMY	0	0	0	500	0	0	0	0	0	5.5
0362	HEATERS	6	THROUGHOUT	ARMY	0	0	0	1200	0	0	0	0	0	13.2
0362	MOTOR, 1 HP	1	E END	ARMY	0	0	0	150	0	0	0	0	0	1.65
0362	TANK, 500 GAL	1	E END	ARMY	0	0	0	500	0	0	0	0	0	5.5
0362	VESSEL, 30 GAL	1	E END	ARMY	0	0	0	200	0	0	0	0	0	2.2
0364	PUMP, 1 HP	2		ARMY	0	0	0	75	0	0	0	0	0	0.83

Notes:

AL = aluminum weight
BLDG = building
CAST = cast iron
CST = carbon steel
CU = copper
E = East
GAL = gallons
HAST = hasteloy
HP = horsepower
LB =
NICK = nickel
STLES = stainless
TITAN = titanium
UNSAL = unsalvageable

TABLE 3-7
STRUCTURES IN THE SOUTH PLANTS WAREHOUSE AREA
ROCKY MOUNTAIN ARSENAL

BUILDING	FACILITY	CONTAMINANTS	ASSOCIATED AST	ASSOCIATED UST	VOLUME OF EQUIPMENT EXISTING (yd^3)	VOLUME OF PIPING EXISTING (yd^3)	PCB TRANSFORMERS	MERCURY	ACM	PCB YTAG	PCB BTAG
0326	Power Plant Pumphouse & Spray Pond	None	0	0	4	47	N	N	Y	0	6
0328	Goop-Mixing and Filling Building	HISTORICAL: Chemical agents, magnesium dust, goop, lead azide, cyclonite, white phosphorus, napalm, santoosl, benzene, oil asphalt mixture, magnesium metals, sodium nitrate, gasoline, phenol petroleum oil extract, isobutyl methacrylate polymer	6	0	73	0	N	E	Y	76	23
0329	Gasoline Pump Building	HISTORICAL: Gasoline, benzene, magnesium paste, goop, thickening agents	0	3	0	2	N	N	Y	2	11
0331	Phosgene Filling Warehouse	HISTORICAL: Core sample, heresite coating, hydroxide sludge, MD, naphtha, oil, paint, paint thinner, phosgene, spent sodium hydroxide, sodium spent coke SAMPLING: Air: chromium, zinc, mercury, arsenic, copper, benzene, carbon tetrachloride, ethylbenzene, tetrachloroethylene, toluene, xylenes, chloroform Dust/Vacuum: arsenic, cadmium, chromium, copper, lead, zinc, mercury Dust/Wipe: chromium, lead, zinc, thiodiglycol, chloroacetic acid	0	0	50	36	N	N	Y	2	19
0332	Warehouse	HISTORICAL: Core samples, PCB oil, phosgene	0	0	9	36	Y	N	Y	1	2
0333	Warehouse	HISTORICAL: Aldrin, azodrin, bidrin, DBCP, gasoline, isobutylemthacrylate, pesticides, thickening agent, vapona, white phosphorus SAMPLING: Dust: aldrin, cadmium, chlorophenyl methyl sulfone, chromium, dieldrin, endrin, isodrin, lead, zinc	0	0	9	27	N	N	Y	0	5
0334	Warehouse	HISTORICAL: None SAMPLING: Surficial soil (0-2 inches): aldrin, chlordane, DDE, dieldrin, endrin, isodrin	0	0	0	36	N	N	Y	NSR	NSR

TABLE 3-7
STRUCTURES IN THE SOUTH PLANTS
WAREHOUSE AREA
ROCKY MOUNTAIN ARSENAL

BUILDING	FACILITY	CONTAMINANTS	ASSOCIATED AST	ASSOCIATED UST	VOLUME OF EQUIPMENT EXISTING (yd^3)	VOLUME OF PIPING EXISTING (yd^3)	PCB TRANSFORMERS	MERCURY	ACM	PCB YTAG	PCB BTAG
335	Warehouse	HISTORICAL: Aldrin, chlorinated hydrocarbons, DBCP, DBCP 12.1EC, dieldrin, endrin, pesticides, medical supplies, vapona, white phosphorus SAMPLING: Dust: aldrin, arsenic, cadmium, chromium, dieldrin, hexachlorocyclopentadiene, isodrin, lead, zinc	0	0	36	0	N	N	Y	0	2
0336	General Purpose Warehouse	HISTORICAL: Aldrin, azodrin, bidrin, chlorinated hydrocarbons, DBCP, dibrom, pesticides, phosdrin, medical supplies, vapona SAMPLING: Dust: cadmium, chromium, copper, lead, zinc	0	0	9	27	N	N	Y	0	2
337	Locker Room/Change House	HISTORICAL: None SAMPLING: Chlorophenylmethyl sulfone, dieldrin, cadmium, chromium, copper, lead, zinc, arsenic	0	0	1	0	N	N	Y	0	1
0341	Change House	None	0	0	1	19	N	N	Y	NSP	NSP
0341B	Sewage Lift Station-covered pit	HISTORICAL: None	0	0	2	0	N	N	Y	0	1
0342	Warehouse/M74 I. B. Storage	HISTORICAL: White phosphorus cups, off-specification incendiary mixes, trichloroethylene degreaser, oil solvent, tail cups, adapters, tail plugs	0	0	1	9	N	N	Y	0	13
0343	MFG Building - Preclustering Warehouse	HISTORICAL: Fuses, magnesium dust paste, oil-asphalt mixtures, petroleum oil extract, white phosphorus, paint, tailcups	0	0	1	9	N	N	Y	2	20
0344	MFG Assembly/Warehouse	HISTORICAL: White phosphorus, paint	0	0	89	9	N	N	Y	0	9
0345	MFG Assembly/Storage/Warehouse	HISTORICAL: White phosphorus, paint	0	0	1	10	N	N	Y	0	6
0346	Warehouse	HISTORICAL: Salt drums, white phosphorus SAMPLING: Surficial soil (0-2 inches): aldrin, dieldrin	0	0	0	9	N	D	Y	1	5

TABLE 3-7
STRUCTURES IN THE SOUTH PLANTS
WAREHOUSE AREA
ROCKY MOUNTAIN ARSENAL

BUILDING	FACILITY	CONTAMINANTS	ASSOCIATED AST	ASSOCIATED UST	VOLUME OF EQUIPMENT EXISTING (yd^3)	VOLUME OF PIPING EXISTING (yd^3)	PCB TRANSFORMERS	MERCURY	ACM	PCB YTAG	PCB BTAG
351	Change House	HISTORICAL: None	0	0	1	0	N	N	Y	0	6
0354	Warehouse	HISTORICAL: Explosive material, raccine rings, fuses, other historically associated chemicals not available	0	0	5	36	N	N	Y	1	8
0355	Warehouse	HISTORICAL: Silicon transformer liquid, chrome oxide or alumina catalyst, other historically associated chemicals not available	0	0	5	36	N	N	Y	NSR	NSR
0356	Warehouse	HISTORICAL: Aldrin, pydrin, azodrin, nudrin, medical supplies, DBCP, aldrin-EC, bidrin, clodrin, dibrom, phosdrin, vapona, phosdrine-E, planavin, herbicides (bladex, atrazine), other associated chemicals not available	0	0	11	27	N	N	Y	1	7
0362	Warehouse	HISTORICAL: Magnesium oxide, potassium chlorate, red phosphorus, silica, silica gel, white phosphorus	2	0	3	55	N	N	Y	17	15
364	Sewage Lift Station-SE of 354	HISTORICAL: Lubricants, sanitary sewage	0	0	1	0	N	N	N	0	3

Notes:

ACM = asbestos-containing materials
AST = aboveground storage tank
BTAG = blue tag, <50ppm or < 10 $\mu g/100\ cm^2$ or nondetect
cm^2 = square centimeters
D = mercury detected
DBCP = dibromochloropropane
DDE = dichlorodiphenyldichloroethene
MFG = manufacturing
N = no
NSR = need samples results
PCB = polychlorinated biphenyl
PCB YTA # of pieces of equipment w/a YTAG.
PCB BTA # of pieces of equipment w/a BTAB.
UST = underground storage tank
yd^3 = cubic yards
Y = yes
YTAG = yellow tag, >50ppm or > 10 $\mu g/100\ cm^2$
µg = micrograms

TABLE 3-8
STRUCTURES IN THE SOUTH PLANTS
WHITE PHOSPHORUS AREA
ROCKY MOUNTAIN ARSENAL

BUILDING	FACILITY	CONTAMINANTS	ASSOCIATED AST	ASSOCIATED UST	VOLUME OF EQUIPMENT EXISTING (yd^3)	VOLUME OF PIPING EXISTING (yd^3)	PCB TRANSFORMERS	MERCURY	ACM	PCB YTAG	PCB BTAG
0542	Drummed Product Storage/Gen.Storage	HISTORICAL: LW, white phosphorus, acetone	0	0	5	9	N	E	Y	NSP	NSP

Notes:

E = mercury-containing equipment observed
BTAG = blue tag, < 50ppm or < 10µg/100cm^2
LW = lewisite
N = No
NSP = no suspect PCB equipment observed
PCB YTAG # of pieces of equipment w/a YTAG.
PCB BTAG # of pieces of equipment w/a BTAG.
Y = Yes
YTAG = yellow tag, > 50 ppm or > 10µg/100cm^2

TABLE 3-9
SALVAGEABLE EQUIPMENT IN THE SOUTH PLANTS
WHITE PHOSPHORUS AREA
ROCKY MOUNTAIN ARSENAL

BLDG	ITEM	QUANTITY	LOCATION	SHELL/ARMY	WEIGHT OF MATERIAL (LB)									TOTAL SCRAP VALUE($)
					UNSAL	CU	STLES	CST	CAST	AL	HAST	TITAN	NICK	
0542	HEATERS	4		ARMY	0	0	0	800	0	0	0	0	0	8.80

Notes:

AL = aluminum weight
BLDG = building
CAST = cast iron
CST = carbon steel
CU = copper
GAL = gallon
HAST = hasteloy
NICK = nickel
STLES = stainless
TITAN = titanium
UNSAL = unsalvageable

TABLE 3-10
UNDERGROUND STORAGE TANKS IN THE SOUTH PLANTS
SOUTHERN TIER PRODUCTION AREA
ROCKY MOUNTAIN ARSENAL

BPRE	BLDG	TPRE	TANK	FACILITY	LOCATION	SHELL	TYPE	CAPACITY (GAL)	ST_MATERIAL	LAST-KNOWN CONTENTS
	0417		0417	H DECON PIT	BLDG 417 IS WEST OF BLDGS 412 AND 416	N	UST/PIT	INA	CONCRETE	H; DECON FROM H PRODUCTION; CAUSTIC; DICHLOR; BLEACH; SULFUR MONOCHLORIDE; CHLORINE; SULFUR
	0431	T	0002	ETHYLENE DRYER/COMPRESSOR/REFRIG	TANK 0002 IS LOCATED OUTSIDE, ADJACENT TO WEST SIDE OF BLDG 431. BLDG 431 IS BETWEEN BLDGS 422 AND 412	N	UST	987	CONCRETE	UNKNOWN
	0431	T	0001	ETHYLENE DRYER/COMPRESSOR/REFRIG	T0001 IS LOCATED ~34 FEET EAST OF 431 AND ~56 FEET WEST OF 422	N	UST/SUMP	INA	CONCRETE	PROBABLY WASTE CHEMICALS
	0435	T	0001	EAST GAS HOLDER	T0001 IS LOCATED ~10 FEET SOUTHWEST OF BLDG 435	Y	UST/SUMP	564	CONCRETE	WATER AND UNKNOWNS
	0459A	T	0001	LIME SLURRY PUMP HOUSE	TANK T0001 IS ON THE SOUTH SIDE AND ADJACENT TO BLDG 459A. BLDG 459A IS EAST OF BLDG 459	Y	UST/SUMP	2,200	CONCRETE	LIME SLURRY
	0473	T	0002	TC DRUM LOADING/PESTICIDE PKG.	T0002 IS ~20 FEET SOUTH OF THE SOUTHEAST CORNER OF 473	Y	UST/SUMP	598	CONCRETE	UNKNOWN

Notes:
BLDG = building
BPRE = building prefix
GAL = gallons
H DECON = mustard decontamination
INA = information not available
N = no
PKG. = packaging
S. = southern
ST_MATERIAL = structural material
SW = southwest
T = tank
TC = thionyl chloride
TPRE = tank prefix
UST = underground storage tank
Y = yes

TABLE 3-11
ABOVEGROUND STORAGE TANKS IN THE SOUTH PLANTS
SOUTHERN TIER PRODUCTION AREA
ROCKY MOUNTAIN ARSENAL

BPRE	BLDG	TPRE	TANK	FACILITY	LAST-KNOWN CONTENTS	SHELL	IN-OUT	TYPE	CAPACITY (GAL)	ST_MATERIAL
	0432	T	0001	CHANGE HOUSE (FOUNDATION)	UNKNOWN	N	OUTSIDE	AST	1,414	STEEL
	0451	V	1308	WAREHOUSE/PRODUCTION FILLING	UNKNOWN	Y	OUTSIDE	AST/VESSEL	212	STEEL
	0461	T	0001	TANK FARM PUMPHOUSE	UNKNOWN	N	OUTSIDE	AST	INA	STEEL
	0471	T	0003	TC REACTOR/PESTICIDE PROD.	UNKNOWN	Y	OUTSIDE	AST	375	CONCRETE
	0471	T	0130	TC REACTOR/PESTICIDE PROD.	CARBON TETRACHLORIDE STORAGE FROM 1973-1976	Y	OUTSIDE	AST	8,000	STEEL
	0471	T	0131	TC REACTOR/PESTICIDE PROD.	NEMAGON	Y	OUTSIDE	AST	8,000	STEEL
	0471	T	0132	TC REACTOR/PESTICIDE PROD.	UNKNOWN	Y	OUTSIDE	AST	10,000	STEEL
	0471	T	0133	TC REACTOR/PESTICIDE PROD.	MINERAL SPIRITS	Y	OUTSIDE	AST	8,000	STEEL
	0471	T	0273	TC REACTOR/PESTICIDE PROD.	UNKNOWN	Y	OUTSIDE	AST	1,650	STEEL
	0471	V	1304	TC REACTOR/PESTICIDE PROD.	UNKNOWN	Y	OUTSIDE	AST/VESSEL	212	STEEL
	0471C	T	0036	REFRIGERATION	COOLANT - POSSIBLY FREON	Y	OUTSIDE	AST	2,203	STEEL
	0472	T	0208	THIONYL CHLORIDE REFRIGERATION	UNKNOWN	Y	OUTSIDE	AST	4,901	STEEL
	0473	C	1050	TC DRUM LOADING/PESTICIDE PKG.	CAUSTIC AND OTHER UNKNOWNS	Y	OUTSIDE	AST/SCRUBBER	159	UNKNOWN
	0473	T	0001	TC DRUM LOADING/PESTICIDE PKG.	CAUSTIC	Y	OUTSIDE	AST	140	STEEL
	0473	T	1037	TC DRUM LOADING/PESTICIDE PKG.	BROMINE	Y	OUTSIDE	AST	300	NICKEL
	0473	T	1048	TC DRUM LOADING/PESTICIDE PKG.	BROMINE	Y	OUTSIDE	AST	3,000	STEEL
	0473	T	1142	TC DRUM LOADING/PESTICIDE PKG.	UNKNOWN	Y	OUTSIDE	AST	185	STEEL
	0473	V	1061	TC DRUM LOADING/PESTICIDE PKG.	UNKNOWN	Y	OUTSIDE	AST	53	STAINLESS STEEL
	0473	V	1064	TC DRUM LOADING/PESTICIDE PKG.	PESTICIDES OR PESTICIDE RAW MATERIALS	Y	OUTSIDE	AST	370	STEEL

Notes:
AST = aboveground storage tank
BLDG = building
BPRE = building prefix
C = column
INA = information not available
N = no
NN = no number
PKG. = Packaging
PROD. = Production
R = reactor
ST_MATERIAL = structural material
T = tank
TC = thionyl chloride
TPRE = tank prefix
V = vessel
Y = yes

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TABLE 3-12
SALVAGEABLE EQUIPMENT IN THE SOUTH PLANTS
SOUTHERN TIER PRODUCTION AREA
ROCKY MOUNTAIN ARSENAL

BLDG	ITEM	QUANTITY	LOCATION	SHELL/ARMY	WEIGHT OF MATERIAL (LB)									Total Scrap Value ($)
					UNSAL	CU	STLES	CST	CAST	AL	HAST	TITAN	NICK	
ASY	20-FOOT I-BEAMS, C STEEL	2	AREA 1, RACK 1	ARMY	0	0	0	2000	0	0	0	0	0	22.00
ASY	SUPPORTS	1	AREA 4	ARMY	0	0	0	100	0	0	0	0	0	1.10
ASY	3-PHASE MOTOR, 2 HP	1	AREA 4	ARMY	0	0	0	100	0	0	0	0	0	1.10
ASY	TANK, 200 GAL	1	AREA 3	ARMY	0	0	0	200	0	0	0	0	0	2.20
ASY	CAST IRON FLANGES	11	AREA 4	ARMY	0	0	0	0	110	0	0	0	0	1.21
ASY	TELEPHONE POLES	2	AREA 2	ARMY	400	0	0	0	0	0	0	0	0	0.00
ASY	CAST IRON PIPE, 8 FEET	8	AREA 4	ARMY	0	0	0	0	500	0	0	0	0	5.50
ASY	TROUGH	1	AREA 1	ARMY	0	0	0	300	0	0	0	0	0	3.30
ASY	CORROGATED ALUMINUM, 2 FEET X 2.5 FEET	5	AREA 4	ARMY	0	0	0	0	0	150	0	0	0	45.00
ASY	VESSEL, NON-FERROUS	1	AREA 2	ARMY	0	0	0	0	0	2000	0	0	0	600.00
ASY	DUCT SECTIONS, STEEL	10	AREA 5	ARMY	0	0	0	300	0	0	0	0	0	3.30
ASY	VESSELS, FERROUS	2	AREA 2	ARMY	0	0	0	2000	0	0	0	0	0	22.00
ASY	FERROUS PIPE	7	AREA 1, RACK 4	ARMY	0	0	0	307	0	0	0	0	0	3.38
ASY	WELL VAULTS	3	AREA 2	ARMY	600	0	0	0	0	0	0	0	0	0.00
ASY	FERROUS PIPE,	29	AREA 1, RACK 3	ARMY	0	0	0	1270	0	0	0	0	0	13.97
ASY	WP TANKS, 15000 GAL	3	AREA 5	ARMY	0	0	0	12000	0	0	0	0	0	132.00
ASY	FLAG POLES	2	AREA 2	ARMY	0	0	0	500	0	0	0	0	0	5.50
ASY	POLYPROPYLENE PIPE, 20 FEET	22	AREA 2	ARMY	1500	0	0	0	0	0	0	0	0	0.00
ASY	FRAME STRUCTURE, 15 FEET X 7 FEET X 8 INCHES	1	AREA 1	ARMY	0	0	0	2000	0	0	0	0	0	22.00
ASY	RINGS & SUPPORT BEAMS, FERROUS	1	AREA 2	ARMY	0	0	0	300	0	0	0	0	0	3.30
ASY	HALF CULVERTS	3	AREA 4	ARMY	0	0	0	150	0	0	0	0	0	1.65
ASY	STAINLESS FLANGES	3	AREA 1, RACK 5	ARMY	0	0	150	0	0	0	0	0	0	22.50
ASY	HOPPERS	4	AREA 1	ARMY	0	0	0	8000	0	0	0	0	0	88.00
ASY	STAINLESS STEEL FLANGES	0	AREA 1	ARMY	0	0	500	0	0	0	0	0	0	75.00
ASY	METAL POST	1	AREA 2	ARMY	0	0	0	100	0	0	0	0	0	1.10
ASY	STAIR STEPS	1	AREA 1	ARMY	0	0	0	200	0	0	0	0	0	2.20
ASY	MOTOR, 7.5 HP	1	AREA 3	ARMY	0	0	0	100	0	0	0	0	0	1.10
ASY	STEEL FRAME WOOD PALLETS	7	AREA 1	ARMY	210	0	0	0	0	0	0	0	0	0.00
ASY	STAINLESS STEEL	21	AREA 1, RACK 3	ARMY	0	0	1500	0	0	0	0	0	0	225.00
ASY	STEEL GATES	13	AREA 4	ARMY	0	0	0	400	0	0	0	0	0	4.40

TABLE 3-12
SALVAGEABLE EQUIPMENT IN THE SOUTH PLANTS
SOUTHERN TIER PRODUCTION AREA
ROCKY MOUNTAIN ARSENAL

BLDG	ITEM	QUANTITY	LOCATION	SHELL/ARMY	WEIGHT OF MATERIAL (LB)									Total Scrap Value ($)
					UNSAL	CU	STLES	CST	CAST	AL	HAST	TITAN	NICK	
ASY	STAINLESS STEEL	17	AREA 1, RACK 4	ARMY	0	0	2000	0	0	0	0	0	0	300.00
ASY	STEEL RAILINGS	2	AREA 2	ARMY	0	0	0	1000	0	0	0	0	0	11.00
ASY	PIPE, 10 FEET X 42.5 INCHES, 1/8 INCHES THICK	1	AREA 1	ARMY	0	0	0	0	0	275	0	0	0	82.50
ASY	STEEL FRAME WOOD PALLETS	15	AREA 4	ARMY	450	0	0	0	0	0	0	0	0	0.00
ASY	GALVANIZED FENCE, 42 FEET	1	AREA 1	ARMY	0	0	0	1000	0	0	0	0	0	11.00
ASY	BUFFALO PUMP	1	AREA 4	ARMY	0	0	0	150	0	0	0	0	0	1.65
ASY	I-BEAMS	5	AREA 3	ARMY	0	0	0	5000	0	0	0	0	0	55.00
ASY	CAST IRON JOINTS	17	AREA 4	ARMY	0	0	0	0	200	0	0	0	0	2.20
ASY	NONFERROUS MISC, 4000 LBS	1	AREA 1, DITCH	ARMY	4000	0	0	0	0	0	0	0	0	0.00
ASY	CONCRETE EXTENSIONS	3	AREA 2	ARMY	600	0	0	0	0	0	0	0	0	0.00
ASY	NONFERROUS PIPE, 10 FEET	40	AREA 1, RACK 2	ARMY	0	0	2500	0	0	0	0	0	0	375.00
ASY	HOIST SYSTEM	1	AREA 1	ARMY	0	0	0	200	0	0	0	0	0	2.20
ASY	MISC FERROUS MATERIAL	1	AREA 5	ARMY	0	0	0	500	0	0	0	0	0	5.50
ASY	NONFERROUS PIPE	13	AREA 1, RACK 5	ARMY	0	0	800	0	0	0	0	0	0	120.00
ASY	PIPE, 30 FEET X 2.5 INCHES	175	AREA 4	ARMY	0	0	0	30000	0	0	0	0	0	330.00
ASY	DUCT SECTIONS, AL	22	AREA 5	ARMY	0	0	0	0	0	600	0	0	0	180.00
ASY	FERROUS MISC, 1500 LBS	1	AREA 1, DITCH	ARMY	0	0	0	1500	0	0	0	0	0	16.50
ASY	FERROUS PIPE	28	AREA 1, RACK 5	ARMY	0	0	0	1230	0	0	0	0	0	13.53
ASY	FERROUS PIPE, 10 FEET	13	AREA 1, RACK 2	ARMY	0	0	0	850	0	0	0	0	0	9.35
ASY	FLYWHEEL	1	AREA 4	ARMY	0	0	0	1000	0	0	0	0	0	11.00

Notes:

AL = aluminum weight
ASY = Army Salvage Yard
BLDG = building
CAST = cast iron
CST = carbon steel
CU = copper
GAL = gallons
HAST = hasteloy
HP = horsepower
LB = pounds
NICK = nickel
STLES = stainless
TITAN = titanium
UNSAL = unsalvageable

TABLE 3-13
DETECTION OF ANALYTES IN SAMPLES TAKEN IN THE SOUTHERN TIER PRODUCTION AREA
ROCKY MOUNTAIN ARSENAL

PIPERUN	LOCATION	HISTORICAL DESCRIPTION	SAMPLE_NO	ANALYTE	CAS_NO	UNITS	MATRIX	CONC	DET_LIMIT
	Open pipe at east end of 2nd floor in Bldg 471		471 (001-003)	ARSENIC	7740-38-2	mg/kg	WIPE	<0.34	0.10
	Open pipe at east end of 2nd floor in Bldg 471		471 (001-003)	CADMIUM	7440-43-9	mg/kg	WIPE	0.099	0.50
	Open pipe at east end of 2nd floor in Bldg 471		471 (001-003)	CHROMIUM	7440-47-3	mg/kg	WIPE	7.10	0.50
	Open pipe at east end of 2nd floor in Bldg 471		471 (001-003)	COPPER	7440-50-8	mg/kg	WIPE	768.00	0.50
	Open pipe at east end of 2nd floor in Bldg 471		471 (001-003)	LEAD	7439-92-1	mg/kg	WIPE	19.20	3.0
	Open pipe at east end of 2nd floor in Bldg 471		471 (001-003)	ZINC	7740-66-6	mg/kg	WIPE	121.00	0.50
	Blue 4" pipe near E. door 3rd floor of Bldg 471		471 (004-006)	ARSENIC	7740-38-2	mg/kg	WIPE	1.00	0.10
	Blue 4" pipe near E. door 3rd floor of Bldg 471		471 (004-006)	CADMIUM	7440-43-9	mg/kg	WIPE	0.079	0.50
	Blue 4" pipe near E. door 3rd floor of Bldg 471		471 (004-006)	CHROMIUM	7440-47-3	mg/kg	WIPE	149.00	0.50
	Blue 4" pipe near E. door 3rd floor of Bldg 471		471 (004-006)	COPPER	7440-50-8	mg/kg	WIPE	10.50	0.50
	Blue 4" pipe near E. door 3rd floor of Bldg 471		471 (004-006)	LEAD	7439-92-1	mg/kg	WIPE	10.20	3.0
	Blue 4" pipe near E. door 3rd floor of Bldg 471		471 (004-006)	ZINC	7740-66-6	mg/kg	WIPE	11.00	0.50
	Glass tube with a temp. gauge near east door, 3rd floor of Bldg 471		471 (007-009)	ARSENIC	7740-38-2	mg/kg	WIPE	0.61	0.10
	Glass tube with a temp. gauge near east door, 3rd floor of Bldg 471		471 (007-009)	CADMIUM	7440-43-9	mg/kg	WIPE	<0.024	0.50
	Glass tube with a temp. gauge near east door, 3rd floor of Bldg 471		471 (007-009)	CHROMIUM	7440-47-3	mg/kg	WIPE	19.90	0.50
	Glass tube with a temp. gauge near east door, 3rd floor of Bldg 471		471 (007-009)	COPPER	7440-50-8	mg/kg	WIPE	1.60	0.50
	Glass tube with a temp. gauge near east door, 3rd floor of Bldg 471		471 (007-009)	LEAD	7439-92-1	mg/kg	WIPE	2.20	3.0
	Glass tube with a temp. gauge near east door, 3rd floor of Bldg 471		471 (007-009)	ZINC	7740-66-6	mg/kg	WIPE	8.90	0.50
	Valve located in fuel pumphouse 459C		459C	2-METHYLNAPHTHALENE	91-57-6	µg/L	GRAB	81.00	100.00
	Valve located in fuel pumphouse 459C		459C	PHENANTHRENE	85-01-8	µg/L	GRAB	31.00	100.00
	Valve located in fuel pumphouse 459C		459C	PYRENE	129-00-0	µg/L	GRAB	33.00	100.00
	Valve located in fuel pumphouse 459C		459C	METHYLENE CHLORIDE	75-09-2	µg/L	GRAB	3300.00	260.00
	Valve located in fuel pumphouse 459C		459C	BICYCLOHEPTADIENE	121-46-0	µg/L	GRAB	82.00	10.00
	Valve located in fuel pumphouse 459C		459C	PENTANONE	107-87-9	µg/L	GRAB	190.00	20.00
	Valve located in fuel pumphouse 459C		459C	BENZENE	71-43-2	µg/L	GRAB	42.00	5.00

TABLE 3-13
DETECTION OF ANALYTES IN SAMPLES TAKEN IN THE SOUTHERN TIER PRODUCTION AREA
ROCKY MOUNTAIN ARSENAL

PIPERUN	LOCATION	HISTORICAL DESCRIPTION	SAMPLE_NO	ANALYTE	CAS_NO	UNITS	MATRIX	CONC	DET_LIMIT
	Valve located in fuel pumphouse 459C		459C	METHYLPENTANONE	108-10-1	µg/L	GRAB	49.00	20.00
	Valve located in fuel pumphouse 459C		459C	TOLUENE	108-88-3	µg/L	GRAB	420.00	5.00
	Valve located in fuel pumphouse 459C		459C	DICYCLOPENTADIENE	77-33-6	µg/L	GRAB	160.00	10.00
	Valve located in fuel pumphouse 459C		459C	ETHYLBENZENE	100-41-4	µg/L	GRAB	21.00	5.00
	Valve located in fuel pumphouse 459C		459C	M-XYLENE	108-38-3	µg/L	GRAB	48.00	5.00
	Valve located in fuel pumphouse 459C		459C	O&P-XYLENE	106-42-3	µg/L	GRAB	56.00	5.00
J31		FUEL OIL	4-42-03	ARSENIC	7740-38-2	mg/kg	WIPE	<2.7	0.10
J31		FUEL OIL	4-42-03	CADMIUM	7440-43-9	mg/kg	WIPE	0.36	0.50
J31		FUEL OIL	4-42-03	CHROMIUM	7440-47-3	mg/kg	WIPE	4.90	0.50
J31		FUEL OIL	4-42-03	COPPER	7440-50-8	mg/kg	WIPE	9.90	0.50
J31		FUEL OIL	4-42-03	LEAD	7439-92-1	mg/kg	WIPE	397.00	3.0
J31		FUEL OIL	4-42-03	ZINC	7740-66-6	mg/kg	WIPE	177.00	0.50
J37		UNKNOWN	4-41-010	ARSENIC	7740-38-2	mg/kg	WIPE	<.0.37	0.10
J37		UNKNOWN	4-41-010	CADMIUM	7440-43-9	mg/kg	WIPE	0.26	0.50
J37		UNKNOWN	4-41-010	CHROMIUM	7440-47-3	mg/kg	WIPE	1.30	0.50
J37		UNKNOWN	4-41-010	COPPER	7440-50-8	mg/kg	WIPE	8.00	0.50
J37		UNKNOWN	4-41-010	LEAD	7439-92-1	mg/kg	WIPE	2.40	3.0
J37		UNKNOWN	4-41-010	ZINC	7740-66-6	mg/kg	WIPE	4.20	0.50
J37		UNKNOWN	4-41-010	DIELDRIN	60-57-1	µg/cm²	WIPE	0.0007	.40E-2
J37		UNKNOWN	4-41-09	ARSENIC	7740-38-2	mg/kg	WIPE	<0.34	0.10
J37		UNKNOWN	4-41-09	CADMIUM	7440-43-9	mg/kg	WIPE	0.27	0.50
J37		UNKNOWN	4-41-09	CHROMIUM	7440-47-3	mg/kg	WIPE	1.90	0.50
J37		UNKNOWN	4-41-09	COPPER	7440-50-8	mg/kg	WIPE	30.30	0.50
J37		UNKNOWN	4-41-09	LEAD	7439-92-1	mg/kg	WIPE	3.10	3.0
J37		UNKNOWN	4-41-09	ZINC	7740-66-6	mg/kg	WIPE	5.00	0.50
J37		UNKNOWN	4-41-09	ALDRIN	309-00-2	µg/cm²	WIPE	.10E-2	.20E-3
J37		UNKNOWN	4-41-09	DIELDRIN	60-57-1	µg/cm²	WIPE	.20E-2	.20E-3
J37		UNKNOWN	4-41-08	ARSENIC	7740-38-2	mg/kg	WIPE	<0.39	0.10
J37		UNKNOWN	4-41-08	CADMIUM	7440-43-9	mg/kg	WIPE	0.26	0.50
J37		UNKNOWN	4-41-08	CHROMIUM	7440-47-3	mg/kg	WIPE	1.40	0.50
J37		UNKNOWN	4-41-08	COPPER	7440-50-8	mg/kg	WIPE	4.20	0.50
J37		UNKNOWN	4-41-08	LEAD	7439-92-1	mg/kg	WIPE	1.90	3.0
J37		UNKNOWN	4-41-08	ZINC	7740-66-6	mg/kg	WIPE	6.50	0.50
J37		VAPONA VENT	4-41-04	ARSENIC	7740-38-2	mg/kg	WIPE	<0.70	0.10
J37		VAPONA VENT	4-41-04	CADMIUM	7440-43-9	mg/kg	WIPE	0.72	0.50
J37		VAPONA VENT	4-41-04	CHROMIUM	7440-47-3	mg/kg	WIPE	120.20	0.50
J37		VAPONA VENT	4-41-04	COPPER	7440-50-8	mg/kg	WIPE	11.00	0.50
J37		VAPONA VENT	4-41-04	LEAD	7439-92-1	mg/kg	WIPE	4.30	3.0
J37		VAPONA VENT	4-41-04	ZINC	7740-66-6	mg/kg	WIPE	16.10	0.50
J37		VAPONA VENT	4-41-04	ALDRIN	309-00-2	µg/cm²	WIPE	.40E-3	.20E-3
J37		VAPONA VENT	4-41-04	DIELDRIN	60-57-1	µg/cm²	WIPE	.80E-3	.20E-3
J37		UNKNOWN	4-41-06	ARSENIC	7740-38-2	mg/kg	WIPE	<0.37	0.10
J37		UNKNOWN	4-41-06	CADMIUM	7440-43-9	mg/kg	WIPE	0.18	0.50
J37		UNKNOWN	4-41-06	CHROMIUM	7440-47-3	mg/kg	WIPE	2.7	0.50
J37		UNKNOWN	4-41-06	COPPER	7440-50-8	mg/kg	WIPE	26.1	0.50
J37		UNKNOWN	4-41-06	LEAD	7439-92-1	mg/kg	WIPE	2.5	3.0
J37		UNKNOWN	4-41-06	ZINC	7740-66-6	mg/kg	WIPE	4.6	0.50
J37		UNKNOWN	4-41-06	ALDRIN	309-00-2	µg/cm²	WIPE	0.0005	0.0002
J37		UNKNOWN	4-41-06	DIELDRIN	60-57-1	µg/cm²	WIPE	0.0007	0.0002
J37		CHEM SEWER	4-41-5	ARSENIC	7740-38-2	mg/L	GRAB	0.01	0.0010
J37		CHEM SEWER	4-41-5	CADMIUM	7440-43-9	mg/L	GRAB	<.0040	0.0050
J37		CHEM SEWER	4-41-5	CHROMIUM	7440-47-3	mg/L	GRAB	<0.0050	0.0050
J37		CHEM SEWER	4-41-5	COPPER	7440-50-8	mg/L	GRAB	0.0073	0.0050
J37		CHEM SEWER	4-41-5	LEAD	7439-92-1	mg/L	GRAB	<0.030	0.030
J37		CHEM SEWER	4-41-5	MERCURY	7439-97-6	mg/L	GRAB	<.00020	0.00020
J37		CHEM SEWER	4-41-5	ZINC	7740-66-6	mg/L	GRAB	0.013	0.0050
J37		CHEM SEWER	4-41-5	p-CHLOROPHENYLMETHYL SULFONE	98-57-7	µg/L	GRAB	3.00	20.00
J37		CHEM SEWER	4-41-5	METHYLENE CHLORIDE	75-09-2	µg/L	GRAB	5400.00	500.00
J37		CHEM SEWER	4-41-5	CHLOROFORM	67-66-3	µg/L	GRAB	1800.00	500.00
J37		CHEM SEWER	4-41-5	TETRACHLOROETHENE	127-18-4	µg/L	GRAB	2.00	5.00
J37		CHEM SEWER	4-41-5	O&P-XYLENE	106-42-3	µg/L	GRAB	5.00	5.00
J37		CHEM SEWER	4-41-5	ARSENIC	7740-38-2	mg/L	GRAB	0.01	0.0010
J37		UNKNOWN	4-41-07	ARSENIC	7740-38-2	mg/kg	GRAB	13.20	0.10
J37		UNKNOWN	4-41-07	CADMIUM	7440-43-9	mg/kg	GRAB	<0.88	0.50
J37		UNKNOWN	4-41-07	CHROMIUM	7440-47-3	mg/kg	GRAB	215.00	0.50
J37		UNKNOWN	4-41-07	COPPER	7440-50-8	mg/kg	GRAB	1020.00	0.50
J37		UNKNOWN	4-41-07	LEAD	7439-92-1	mg/kg	GRAB	705.00	3.0
J37		UNKNOWN	4-41-07	MERCURY	7439-97-6	mg/kg	GRAB	0.96	0.067
J37		UNKNOWN	4-41-07	ZINC	7740-66-6	mg/kg	GRAB	125.00	0.50

TABLE 3-13
DETECTION OF ANALYTES IN SAMPLES TAKEN IN THE SOUTHERN TIER PRODUCTION AREA
ROCKY MOUNTAIN ARSENAL

PIPERUN	LOCATION	HISTORICAL DESCRIPTION	SAMPLE_NO	ANALYTE	CAS_NO	UNITS	MATRIX	CONC	DET_LIMIT
J37		UNKNOWN	4-41-07	DIELDRIN	60-57-1	µg/kg	GRAB	3800.00	3300.00
J37		UNKNOWN	4-41-07	2-METHYLNAPHTHALENE	91-57-6	µg/kg	GRAB	46.00	360.00
J37		UNKNOWN	4-41-07	FLUORANTHENE	206-44-0	µg/kg	GRAB	180.00	360.00
J37		UNKNOWN	4-41-07	PYRENE	129-00-0	µg/kg	GRAB	150.00	360.00
J37		UNKNOWN	4-41-07	METHYLENE CHLORIDE	75-09-2	µg/kg	GRAB	60.00	5.00
J37		UNKNOWN	4-41-07	M-XYLENE	108-38-3	µg/kg	GRAB	4.00	5.00
J37		UNKNOWN	4-41-07	O&P-XYLENE	106-42-3	µg/kg	GRAB	5.00	5.00
J37		UNKNOWN	4-41-09(14-1)	ARSENIC	7740-38-2	mg/L	GRAB(B)	<0.0050	0.0010
J37		UNKNOWN	4-41-09(14-1)	CADMIUM	7440-43-9	mg/L	GRAB(B)	<0.0040	0.0050
J37		UNKNOWN	4-41-09(14-1)	CHROMIUM	7440-47-3	mg/L	GRAB(B)	<0.0050	0.0050
J37		UNKNOWN	4-41-09(14-1)	COPPER	7440-50-8	mg/L	GRAB(B)	<0.0050	0.0050
J37		UNKNOWN	4-41-09(14-1)	LEAD	7439-92-1	mg/L	GRAB(B)	<0.030	0.030
J37		UNKNOWN	4-41-09(14-1)	MERCURY	7439-97-6	mg/L	GRAB(B)	<0.0002	0.00020
J37		UNKNOWN	4-41-09(14-1)	ZINC	7740-66-6	mg/L	GRAB(B)	0.01	0.0050
J40		CHLORAL	4-44-11	ARSENIC	7740-38-2	mg/kg	WIPE	<0.34	0.10
J40		CHLORAL	4-44-11	CADMIUM	7440-43-9	mg/kg	WIPE	0.42	0.50
J40		CHLORAL	4-44-11	CHROMIUM	7440-47-3	mg/kg	WIPE	16.30	0.50
J40		CHLORAL	4-44-11	COPPER	7440-50-8	mg/kg	WIPE	0.96	0.50
J40		CHLORAL	4-44-11	LEAD	7439-92-1	mg/kg	WIPE	0.56	3.0
J40		CHLORAL	4-44-11	ZINC	7740-66-6	mg/kg	WIPE	11.10	0.50
J40		CHLORAL	4-44-11	DIELDRIN	60-57-1	µg/cm²	WIPE	.40E-3	.20E-3
J40		CHLORAL	4-44-11	ENDRIN	72-20-8	µg/cm²	WIPE	.40E-3	.20E-3
J40		UNKNOWN	4-44-14	ARSENIC	7740-38-2	mg/kg	WIPE	0.70	0.10
J40		UNKNOWN	4-44-14	CADMIUM	7440-43-9	mg/kg	WIPE	0.77	0.50
J40		UNKNOWN	4-44-14	CHROMIUM	7440-47-3	mg/kg	WIPE	8.60	0.50
J40		UNKNOWN	4-44-14	COPPER	7440-50-8	mg/kg	WIPE	23.50	0.50
J40		UNKNOWN	4-44-14	LEAD	7439-92-1	mg/kg	WIPE	1.10	3.0
J40		UNKNOWN	4-44-14	ZINC	7740-66-6	mg/kg	WIPE	4.40	0.50
J40		UNKNOWN	4-44-14	4,4'-DDT	50-29-8	µg/cm²	WIPE	.10E-2	.20E-3
J40		UNKNOWN	4-44-13	ARSENIC	7740-38-2	mg/kg	WIPE	<0.36	0.10
J40		UNKNOWN	4-44-13	CADMIUM	7440-43-9	mg/kg	WIPE	0.26	0.50
J40		UNKNOWN	4-44-13	CHROMIUM	7440-47-3	mg/kg	WIPE	159.00	0.50
J40		UNKNOWN	4-44-13	COPPER	7440-50-8	mg/kg	WIPE	2.30	0.50
J40		UNKNOWN	4-44-13	LEAD	7439-92-1	mg/kg	WIPE	3.70	3.0
J40		UNKNOWN	4-44-13	ZINC	7740-66-6	mg/kg	WIPE	6.40	0.50
J40		UNKNOWN	4-44-13	DIELDRIN	60-57-1	µg/cm²	WIPE	.20E-3	.20E-3
J40		UNKNOWN	4-44-13	4,4'-DDT	50-29-8	µg/cm²	WIPE	.40E-3	.20E-3
J40		TMP	4-44-12	ARSENIC	7740-38-2	mg/kg	WIPE	<0.34	0.10
J40		TMP	4-44-12	CADMIUM	7440-43-9	mg/kg	WIPE	0.054	0.50
J40		TMP	4-44-12	CHROMIUM	7440-47-3	mg/kg	WIPE	1.70	0.50
J40		TMP	4-44-12	COPPER	7440-50-8	mg/kg	WIPE	0.76	0.50
J40		TMP	4-44-12	LEAD	7439-92-1	mg/kg	WIPE	0.87	3.0
J40		TMP	4-44-12	ZINC	7740-66-6	mg/kg	WIPE	3.40	0.50

NOTES:

CAS_NO = chemical abstracts system number
CONC = concentration detected
DDT = dichlorodiphenyltrichloroethane
DET_LIMIT = detection limit
E. = east
mg/kg = milligrams per kilogram
SAMPLE_NO = sample number
µg/kg = micrograms per kilogram
µg/L = micrograms per liter

TABLE 3-14
UNDERGROUND STORAGE TANKS IN THE SOUTH PLANTS
SHOPS AREA
ROCKY MOUNTAIN ARSENAL

BPRE	BLDG	TPRE	TANK	FACILITY	LOCATION	SHELL	TYPE	CAPACITY (GAL)	ST_MATERIAL	LAST KNOWN CONTENTS
	0743	T	0002	CHEMICAL LABORATORY	SUMP 0002 IS OUTSIDE NORTHEAST CORNER OF BLDG 743	N	UST/SUMP	INA	CONCRETE	STEAM CONDENSATE
	0743A		0743A	SEWAGE PUMPING STATION	SUMP 743A IS OUTSIDE NORTHWEST CORNER OF BLDG 743	N	UST	INA	CONCRETE	WASTE/DECONTAMINATION WATER

Notes:
BLDG = building
BPRE = building prefix
GAL = gallons
INA = information not available
N = No
ST_Material = structural material
T = tank
TPRE = tank prefix
UST = underground storage tank

TABLE 3-15
ABOVEGROUND STORAGE TANKS IN THE SOUTH PLANTS
SHOP AREA
ROCKY MOUNTAIN ARSENAL

BPRE	BLDG	TPRE	TANK	FACILITY	LAST-KNOWN CONTENTS	SHELL	IN-OUT	TYPE	CAPACITY (GAL)	ST_MATERIAL
	0551		0551	ELEVATED STORAGE TANK	WATER	N	OUTSIDE	AST	500,000	STEEL
	0732	T	0004	ARMY RESERVE WAREHOUSE/ M19 REWORKING	PROBABLY WASTES FROM M19 REWORKING	N	INSIDE	AST	269	STEEL
	0744	T	0001	GASOLINE-BENZOL (IOB) PUMPHOUSE	PROBABLY GASOLINE OR BENZOL; POSSIBLY DCPD	N	INSIDE	AST	53	STEEL
	0744	T	0002	GASOLINE-BENZOL (IOB) PUMPHOUSE	PROBABLY GASOLINE OR BENZOL, POSSIBLY DCPD	N	INSIDE	AST	53	STEEL
	0751	T	0001	PAINT & PROCESS SHOP	PROBABLY DEGREASING SOLVENTS	N	INSIDE	AST	1,795	STEEL
	0751	T	0002	PAINT & PROCESS SHOP	PROBABLY DEGREASING SOLVENTS	N	INSIDE	AST	112	STEEL
	0751	T	0003	PAINT & PROCESS SHOP	PROBABLY DEGREASING SOLVENTS AND PAINT STRIPPING SOLVENTS	N	INSIDE	AST	269	STEEL
NN	0116A	T	0003	FUEL STORAGE AREA	CONTAINERS WITH WASTE OILS/FUELS	N	OUTSIDE	AST	180	STEEL

Notes:

AST = aboveground storage tank
BLDG = building
BPRE = building prefix
DCPD = dicyclopentadiene
GAL = gallons
IOB = incendiary oil bomb
N = no
ST_MATERIAL = structural material
T = tank
TPRE = tank prefix

TABLE 3-16
DETECTION OF ANALYTES IN SAMPLES TAKEN IN THE SHOP AREA
ROCKY MOUNTAIN ARSENAL

LOCATION	HISTORICAL DESCRIPTION	SAMPLE_NO	ANALYTE	CAS_NO	UNITS	MATRIX	CONC	DET_LIMIT
North vat (paint booth) in Bldg. 751	DEGREASING VAT	751 (001)	ARSENIC	7740-38-2	mg/kg	GRAB	<1.4	0.10
North vat (paint booth) in Bldg. 751	DEGREASING VAT	751 (001)	CADMIUM	7440-43-9	mg/kg	GRAB	<0.55	0.50
North vat (paint booth) in Bldg. 751	DEGREASING VAT	751 (001)	CHROMIUM	7440-47-3	mg/kg	GRAB	30.60	0.50
North vat (paint booth) in Bldg. 751	DEGREASING VAT	751 (001)	COPPER	7440-50-8	mg/kg	GRAB	31.20	0.50
North vat (paint booth) in Bldg. 751	DEGREASING VAT	751 (001)	LEAD	7439-92-1	mg/kg	GRAB	132.00	3.0
North vat (paint booth) in Bldg. 751	DEGREASING VAT	751 (001)	MERCURY	7439-97-6	mg/kg	GRAB	0.15	0.067
North vat (paint booth) in Bldg. 751	DEGREASING VAT	751 (001)	ZINC	7740-66-6	mg/kg	GRAB	1520.00	0.50
Middle vat (paint booth) in Bldg. 751	DEGREASING VAT	751 (002)	ARSENIC	7740-38-2	mg/kg	GRAB	<0.99	0.10
Middle vat (paint booth) in Bldg. 751	DEGREASING VAT	751 (002)	CADMIUM	7440-43-9	mg/kg	GRAB	<0.40	0.50
Middle vat (paint booth) in Bldg. 751	DEGREASING VAT	751 (002)	CHROMIUM	7440-47-3	mg/kg	GRAB	130.00	0.50
Middle vat (paint booth) in Bldg. 751	DEGREASING VAT	751 (002)	COPPER	7440-50-8	mg/kg	GRAB	<0.5	0.50
Middle vat (paint booth) in Bldg. 751	DEGREASING VAT	751 (002)	LEAD	7439-92-1	mg/kg	GRAB	12.60	3.0
Middle vat (paint booth) in Bldg. 751	DEGREASING VAT	751 (002)	MERCURY	7439-97-6	mg/kg	GRAB	<0.08	0.067
Middle vat (paint booth) in Bldg. 751	DEGREASING VAT	751 (002)	ZINC	7740-66-6	mg/kg	GRAB	1430.00	0.50
Middle vat (paint booth) in Bldg. 751	DEGREASING VAT	751 (003)	ARSENIC	7740-38-2	mg/kg	GRAB	<1.3	0.10
Middle vat (paint booth) in Bldg. 751	DEGREASING VAT	751 (003)	CADMIUM	7440-43-9	mg/kg	GRAB	<.52	0.50
Middle vat (paint booth) in Bldg. 751	DEGREASING VAT	751 (003)	CHROMIUM	7440-47-3	mg/kg	GRAB	110.00	0.50
Middle vat (paint booth) in Bldg. 751	DEGREASING VAT	751 (003)	COPPER	7440-50-8	mg/kg	GRAB	2.30	0.50
Middle vat (paint booth) in Bldg. 751	DEGREASING VAT	751 (003)	LEAD	7439-92-1	mg/kg	GRAB	23.70	3.0
Middle vat (paint booth) in Bldg. 751	DEGREASING VAT	751 (003)	MERCURY	7439-97-6	mg/kg	GRAB	0.17	0.067
Middle vat (paint booth) in Bldg. 751	DEGREASING VAT	751 (003)	ZINC	7740-66-6	mg/kg	GRAB	928.00	0.50
Middle vat (paint booth) in Bldg. 751	DEGREASING VAT	751 (003)	PHENANTHRENE	85-01-8	µg/kg	GRAB	54.00	430.00
Middle vat (paint booth) in Bldg. 751	DEGREASING VAT	751 (003)	FLUORANTHENE	206-44-0	µg/kg	GRAB	97.00	430.00
Middle vat (paint booth) in Bldg. 751	DEGREASING VAT	751 (003)	PYRENE	129-00-0	µg/kg	GRAB	93.00	430.00
Middle vat (paint booth) in Bldg. 751	DEGREASING VAT	751 (003)	METHYLENE CHLORIDE	75-09-2	µg/kg	GRAB	100.00	32.00
Middle vat (paint booth) in Bldg. 751	DEGREASING VAT	751 (003)	BENZENE	71-43-2	µg/kg	GRAB	43.00	32.00
Middle vat (paint booth) in Bldg. 751	DEGREASING VAT	751 (003)	TOLUENE	108-88-3	µg/kg	GRAB	1000.00	32.00
Middle vat (paint booth) in Bldg. 751	DEGREASING VAT	751 (004)	METHYLENE CHLORIDE	75-09-2	µg/kg	GRAB	940.00	620.00
Middle vat (paint booth) in Bldg. 751	DEGREASING VAT	751 (004)	TOLUENE	108-88-3	µg/kg	GRAB	110.00	620.00
South vat (paint booth) in Bldg. 751	DEGREASING VAT	751 (005)	ARSENIC	7740-38-2	mg/kg	GRAB	2.00	0.10
South vat (paint booth) in Bldg. 751	DEGREASING VAT	751 (005)	CADMIUM	7440-43-9	mg/kg	GRAB	3.90	0.50
South vat (paint booth) in Bldg. 751	DEGREASING VAT	751 (005)	CHROMIUM	7440-47-3	mg/kg	GRAB	1140.00	0.50
South vat (paint booth) in Bldg. 751	DEGREASING VAT	751 (005)	COPPER	7440-50-8	mg/kg	GRAB	70.70	0.50
South vat (paint booth) in Bldg. 751	DEGREASING VAT	751 (005)	LEAD	7439-92-1	mg/kg	GRAB	5150.00	3.0
South vat (paint booth) in Bldg. 751	DEGREASING VAT	751 (005)	MERCURY	7439-97-6	mg/kg	GRAB	14.80	0.067
South vat (paint booth) in Bldg. 751	DEGREASING VAT	751 (005)	ZINC	7740-66-6	mg/kg	GRAB	3410.00	0.50
South vat (paint booth) in Bldg. 751	DEGREASING VAT	751 (005)	DIELDRIN	60-57-1	µg/kg	GRAB	1100.00	320.00
South vat (paint booth) in Bldg. 751	DEGREASING VAT	751 (005)	METHYLENE CHLORIDE	75-09-2	µg/kg	GRAB	5800.00	660.00
South vat (paint booth) in Bldg. 751	DEGREASING VAT	751 (005)	TOLUENE	108-88-3	µg/kg	GRAB	2300.00	660.00
South vat (paint booth) in Bldg. 751	DEGREASING VAT	751 (005)	ETHYLBENZENE	100-41-4	µg/kg	GRAB	1100.00	660.00
South vat (paint booth) in Bldg. 751	DEGREASING VAT	751 (005)	M-XYLENE	108-38-3	µg/kg	GRAB	3900.00	660.00
South vat (paint booth) in Bldg. 751	DEGREASING VAT	751 (005)	O&P-XYLENE	106-42-3	µg/kg	GRAB	3100.00	660.00

NOTES:
CAS_NO = chemical abstracts system number
CONC = concentration detected
DET_LIMIT = detection limit
mg/kg = milligrams per kilogram
SAMPLE_NO = sample number
µg/kg = micrograms per kilogram

TABLE 3-17
STRUCTURES IN THE SOUTH PLANTS
SHOP AREA
ROCKY MOUNTAIN ARSENAL

BUILDING	FACILITY	CONTAMINANTS	ASSOCIATED AST	ASSOCIATED UST	VOLUME OF EQUIPMENT EXISTING (yd^3)	VOLUME OF PIPING EXISTING (yd^3)	PCB TRANSFORMERS	MERCURY	ACM	PCB YTAG	PCB BTAG
0543	Maintenance Shops/Instrument Lab	HISTORICAL: Mercury, paints, petroleum products, solvents, thinners SAMPLING: Surficial soil (0-2 inches): aldrin, DDE, DDT, dieldrin, endrin, isodrin	0	0	11	20	N	E	Y	1	54
0543A	Steam Meter Pit	HISTORICAL: Mercury SAMPLING: Surficial soil (0-2 in): aldrin, DDE, DDT, dieldrin, isodrin	0	0	1	0	D	Y	N		
0543B	Facilities Engineers	HISTORICAL: Paints, petroleum products, solvents, thinners SAMPLING: Surficial soil (0-2 inches): aldrin, DDE, DDT, dieldrin, endrin, isodrin	0	0	14	5	N	E	Y	3	4
0544	Heavy Equipment Maintenance Shop	HISTORICAL: Petroleum products, paints, thinners, solvents, degreasers, trichloroethylene, kerosene, copper acetate arsenate, chlordane, lindane, DDT, dieldrin, malathion, diazinon, vapona, naled, carbaryl, propoxur, baygon propoxur, pyrethrum, warfarin, strychnine grain, poison grain, anticoagulant dusting powder, calcium cyanide, diquat, diuron, borate-bromacil mixture, simazine, bordeaux mixture, 2,4,5-T, 2,4-D, sodium 2,2-dichloropropionate, thiram, boric acid, dalapon, endrin, pyrethrins, aisrin, de-pester, ded-weed, diquate water weed killer, insecticide chlordane, insecticide naled, insecticide strip dichlorovos, 797-A powdered insecticide, pyrethrine, silica gel, aranan, thiram, arsenate of lead, baygon roach, propoxur, cyanogas, calcium cyanide, herbicide dimethyl tetrachloroterephalate, malathion, zinc phosphide	0	0	2	3	N	N	Y	5	3
0545	Paint Shop	HISTORICAL: Petroleum products, paints, thinners, solvents	0	0	2	0	N	N	Y	0	7
548	Sewage Lift Station	HISTORICAL: None	0	0	1	0	N	N	N		

TABLE 3-17
STRUCTURES IN THE SOUTH PLANTS
SHOP AREA
ROCKY MOUNTAIN ARSENAL

BUILDING	FACILITY	CONTAMINANTS	ASSOCIATED AST	ASSOCIATED UST	VOLUME OF EQUIPMENT EXISTING (yd^3)	VOLUME OF PIPING EXISTING (yd^3)	PCB TRANSFORMERS	MERCURY	ACM	PCB YTAG	PCB BTAG
548	Water Pumping Station	HISTORICAL: None	0	0	54	0	E	Y	N		
549	Reservoir and Cooling Tower	HISTORICAL: None	0	0	11	0	N	Y	N		
550	Lift Station	HISTORICAL: None	0	0	1	0	N	N	N	0	9
0552	Valve Pit	HISTORICAL: None SAMPLING: Surficial soil (0-2 inches): aldrin, DDE, DDT, dieldrin, endrin, isodrin	0	0	1	5	N	N	N	0	2
553	Vault	HISTORICAL: None	0	0	1	0	N	N	N	0	2
731	Reserve Center/Office/Change House	HISTORICAL: None	0	0	8	0	N	Y	N	0	7
732	Army Reserve Warehouse/M19 Bomb Rew	HISTORICAL: White phosphorus, napalm, black powder, magnesium, oil, photographic chemicals, paint, MD, distilled mustard, nitrogen, LW, PCBs	2	1	11	0	N	Y	N	0	69
0735	Foamite/Oil Product Storage	HISTORICAL: Foamite, oil products, alcofoam SAMPLING: Dust: aldrin, chlorophenylmethyl sulfone, dieldrin	0	0	1	0	N	N	Y	NSP	NSP
0744	Gasoline/Benzol Pumphouse	HISTORICAL: Gasoline, benzene, DCPD SAMPLING: Dust: dicyclopentadiene, cadmium, chromium, copper, lead, zinc, arsenic	2	0	2	0	N	N	Y	0	13

TABLE 3-17
STRUCTURES IN THE SOUTH PLANTS
SHOP AREA
ROCKY MOUNTAIN ARSENAL

BUILDING	FACILITY	CONTAMINANTS	ASSOCIATED AST	ASSOCIATED UST	VOLUME OF EQUIPMENT EXISTING (yd^3)	VOLUME OF PIPING EXISTING (yd^3)	PCB TRANSFORMERS	MERCURY	ACM	PCB YTAG	PCB BTAG
0751	Paint and Process Shop	HISTORICAL: Oakite, chloroethene stoddard, panther, organochlorine degreasing solvents, paint strippers, Turco, rust removers, paints, thinners, solvents, gear oil, rust inhibitors, lubricating oil, grease, petroleum products, chloride	3	0	3	3	N	N	Y	0	30
752	Carpenter Shop/Storage	HISTORICAL: Not available	0	0	1	0	N	Y	N	0	15

Notes:

2,4,5-T = 2,4,5-Trichlorophenoxy acetic acid
2,4-D = 2,4-Dichlorophenoxy acetic acid
ACM = asbestos-containing materials
AST = aboveground storage tank
BTAG = blue tag, <50ppm or < 10 µg/100 cm^2 or nondetect
DBCP = dibromochloropropane
DCPD = dicyclopentadiene
DDE = dichlorodiphenyldichloroethene
DDT = dichlorodiphenyltrichloroethane
E = equipment containing mercury observed
LW = lewisite
N = no
NSP = no suspect PCB equipment
PCB = polychlorinated biphenyl
PCB YTAG = # of pieces of equipment w/a YTAG.
PCB BTAG = # of pieces of equipment w/a BTAG.
UST = underground storage tank
Y = yes
yd^3 = cubic yards
YTAG = yellow tag, >50ppm or > 10 µg/100 cm^2

TABLE 3-18
SALVAGEABLE EQUIPMENT IN THE SOUTH PLANTS
SHOP AREA
ROCKY MOUNTAIN ARSENAL

BLDG	ITEM	QUANTITY	LOCATION	SHELL/ARMY	WEIGHT OF MATERIAL (LB)									Total Scrap Value ($)
					UNSAL	CU	STLES	CST	CAST	AL	HAST	TITAN	NICK	
0543	BLOWER	1		ARMY	0	0	0	100	0	0	0	0	0	1.10
0543	CONDENSATE TANK	1		ARMY	0	0	0	250	0	0	0	0	0	2.75
0543	HOIST, 1 TON	1		ARMY	0	0	0	1000	0	0	0	0	0	11.00
0543	MOTOR	1		ARMY	0	0	0	200	0	0	0	0	0	2.20
0543	PUMP	1		ARMY	0	0	0	150	0	0	0	0	0	1.65
0543	SCRAP METAL RACK	1	SOUTH SIDE	ARMY	0	0	0	1000	0	0	0	0	0	11.00
0543	STEAM HEATER	1		ARMY	0	0	0	200	0	0	0	0	0	2.20
0543	SWAMP COOLER	1		ARMY	0	0	0	500	0	0	0	0	0	5.50
0543	TANKS	2		ARMY	0	0	0	800	0	0	0	0	0	8.80
0543	WATER HEATER	1		ARMY	0	0	0	300	0	0	0	0	0	3.30
0544	AIR CONDITIONER	1		ARMY	0	0	0	300	0	0	0	0	0	3.30
0544	GARAGE DOOR OPENER	1		ARMY	0	0	0	100	0	0	0	0	0	1.10
0544	HEATER	3		ARMY	0	0	0	600	0	0	0	0	0	6.60
0544	VENT DUCT	1		ARMY	0	0	0	300	0	0	0	0	0	3.30
0545	EXHAUST FAN	1		ARMY	0	0	0	50	0	0	0	0	0	0.55
0545	HEATERS	4		ARMY	0	0	0	800	0	0	0	0	0	8.80
0548	TRANSFORMER, PCB FREE	1		ARMY	0	0	0	0	0	0	0	0	0	0.00
0550	MOTORS	3		ARMY	0	0	0	0	0	0	0	0	0	0.00
0553	TOTAL CARBON ANALYZER	1		ARMY	0	0	0	0	0	0	0	0	0	0.00
0731	HEATER	20		ARMY	0	0	0	1000	0	0	0	0	0	11.00
0743	HEATER	5		ARMY	0	0	0	300	0	0	0	0	0	3.30
0743	HOODS	11		ARMY	0	0	0	1050	0	0	0	0	0	11.55
0743	WATER FILTER	1		ARMY	100	0	0	0	0	0	0	0	0	0.00
0743	WATER HEATER	1		ARMY	0	0	0	100	0	0	0	0	0	1.10
0751	COOLING UNIT	1		ARMY	0	0	0	300	0	0	0	0	0	3.30
0751	DIPPING TANKS	2		ARMY	0	0	0	1500	0	0	0	0	0	16.50

TABLE 3-18
SALVAGEABLE EQUIPMENT IN THE SOUTH PLANTS
SHOP AREA
ROCKY MOUNTAIN ARSENAL

BLDG	ITEM	QUANTITY	LOCATION	SHELL/ARMY	WEIGHT OF MATERIAL (LB)									Total Scrap Value ($)
					UNSAL	CU	STLES	CST	CAST	AL	HAST	TITAN	NICK	
0751	EXHAUST SYSTEM	1		ARMY	0	0	0	500	0	0	0	0	0	5.50
0751	HEATERS	4		ARMY	0	0	0	800	0	0	0	0	0	8.80
0751	HOIST	1		ARMY	0	0	0	1000	0	0	0	0	0	11.00
0751	MOTOR, 10 HP	1		ARMY	0	0	0	300	0	0	0	0	0	3.30
0751	SPRAY BOOTH	1		ARMY	0	0	0	1000	0	0	0	0	0	11.00
0751	WATER HEATER	1		ARMY	0	0	0	300	0	0	0	0	0	3.30
0752	COLUMN	1		ARMY	0	0	0	100	0	0	0	0	0	1.10
0752	HEATER	3		ARMY	0	0	0	150	0	0	0	0	0	1.65
0752	HEATER	10		ARMY	0	0	0	500	0	0	0	0	0	5.50
0752	TANKS	2		ARMY	0	0	0	400	0	0	0	0	0	4.40
0752	TRANSFORMER, DRY TYPE	2		ARMY	0	0	0	0	0	0	0	0	0	0.00

Notes:
AL = aluminum weight
BLDG = building
CAST = cast iron
CST = carbon
CU = copper
HAST = hastaloy
HP = horsepower
LB = pounds
NICK = nickel
PCB = polychlorinated biphenyl
STLES = stainless
TITAN = titanium
UNSAL = unsalvageable

TABLE 3-19
STRUCTURES IN THE SOUTH PLANTS AREA
PRODUCTION SUPPORT AREA
ROCKY MOUNTAIN ARSENAL

BUILDING	FACILITY	CONTAMINATION	ASSOCIATED AST	ASSOCIATED UST	VOLUME OF EQUIPMENT EXISTING (yd^3)	VOLUME OF PIPING EXISTING (yd^3)	PCB TRANSFORMERS	MERCURY	ACM	PCB YTAG	PCB BTAG
0313	Laboratory	HISTORICAL: Chemical reagents, acid, alkalines, hydrazine, benzene, oleum, chloroform, p-nitroaniline, benzidine, mustard, GB, VX, hydrochloride, perchloric acid, 1-naphthylamine, chlorine, salt, sodium hydroxide, sulfur monochloride, sulfur dichloride, phosgene, alcohol, dextrin, 1,1,2,2-tetrachloroethane, red phosphorus, napalm, white phosphorus, methanol, arsenic, fluorine, nitric acid, magnesium powder, blasting caps, tetrachloroethylene, carbon tetrachloride, trichloroethylene, laboratory reagents, chlorinated paraffin, paints, fuel oil, bleach, mercury, LW, incendiary mixes, sewage, decontamination agents, various unidentified compounds, solvents, petroleum products, raw materials, Shell plant effluent samples, sludge, toxic vapors, toxic dust, impregnite, sodium chloride	0	0	28	15	N	N	Y	0	63
0313A	Sewage Pump Station	HISTORICAL: Chemicals used in Buildings 313 and 314 SAMPLING: Liquids: chloroform, methylene chloride, tetrachloroethane, calcium, chromium, copper, lead, magnesium, potassium, sodium, zinc, arsenic, mercury, thiodiglycol, nontarget compounds	0	1	1	0	N	NS	N	0	0
0314	Fixed Laundry Service Building	HISTORICAL: Trichloroethylene, zinc oxide, daxad, sodium hypochlorite, ammonium chloride, diammonium phosphate, sodium carbonate, polyvinyl alcohol, phosphate detergents, tetrachloroethylene, 1,1,2,2-tetrachloroethane, chlorinated paraffin, duponal, polyvinyl chloride, bleach, paraformaldehyde, acetone, sodium hydroxide, chloride of lime, chloroethane, naphtha, ammonium sulphate, formaldehyde, monochlorobenzene, monochloride, octachlorocarbanilide (both with and without zinc oxide), benzene, dibasic ammonium sulphate	0	0	120	22	N	N	Y	0	25

TABLE 3-19
STRUCTURES IN THE SOUTH PLANTS AREA
PRODUCTION SUPPORT AREA
ROCKY MOUNTAIN ARSENAL

BUILDING	FACILITY	CONTAMINATION	ASSOCIATED AST	ASSOCIATED UST	VOLUME OF EQUIPMENT EXISTING (yd^3)	VOLUME OF PIPING EXISTING (yd^3)	PCB TRANSFORMERS	MERCURY	ACM	PCB YTAG	PCB BTAG
0315	Warehouse-Laundry	HISTORICAL: GB, tetrachloroethylene	0	0	1	16	N	N	Y	0	5
0409	Condensate Pump House	HISTORICAL: None	0	1	1	0	N	N	Y	0	2
0411A	Steam Meter House	HISTORICAL: Mercury	0	0	1	0	N	D	Y	NSP	NSP
0411B	Steam Meter House	HISTORICAL: Mercury	0	0	0	0	N	N	Y	NSP	NSP

Notes:

ACM = asbestos-containing materials
AST = aboveground storage tank
BTAG = blue tag, <50ppm or < 10 $\mu g/100\ cm^2$ or nondetect
D = mercury detected
GB = isopropyl methylphosphonofluoridate
LW = lewisite
N = no
NS = not sampled
NSP = no suspect PCB equipment
NSR = need sample results
PCB = polychlorinated biphenyl
PCB YTAG = # of pieces of equipment w/a YTAG.
PCB BTAG = # of pieces of equipment w/a BTAG.
ppm = parts per million
UST = underground storage tank
VX = methylphosphonothioic acid
Y = yes
yd^3 = cubic yards
YTAG = yellow tag, >50ppm or > 10 $\mu g/100\ cm^2$

TABLE 3-20
UNDERGROUND STORAGE TANKS IN THE SOUTH PLANTS
PRODUCTION SUPPORT AREA
ROCKY MOUNTAIN ARSENAL

BPRE	BLDG	TPRE	TANK	FACILITY	LOCATION	SHELL	TYPE	CAPACITY (GAL)	ST_MATERIAL	LAST-KNOWN CONTENTS
	0313A		0313A	CHEMICAL SEWER PUMP	NORTHEAST OF BUILDING 314, SUMP ALONG SOUTH SI OF ROAD	N	UST	~1,850	CONCRETE	UNKNOWN
	0409	T	0001	CONDENSATE PUMP HOUSE	BLDG 409 IS NORTH OF BLDG 411, 490 FEET EAST OF D STREET	N	UST	3,100	CONCRETE	WATER

Notes:
BLDG = building
BPRE = building prefix
GAL = gallons
N = no
NE = northeast
ST_MATERIAL = structural material
T = tank
TPRE = tank prefix
UST = underground storage tank
~ = approximately

TABLE 3-21
SALVAGEABLE EQUIPMENT IN THE SOUTH PLANTS
PRODUCTION SUPPORT AREA
ROCKY MOUNTAIN ARSENAL

BLDG	ITEM	QUANTITY	LOCATION	SHELL/ARMY	WEIGHT OF MATERIAL (LB)									Total Scrap Value ($)
					UNSAL	CU	STLES	CST	CAST	AL	HAST	TITAN	NICK	
0313	MOTOR, 1.5 HP	13		ARMY	0	0	0	650	0	0	0	0	0	7.15
0313	COMPRESSOR	2		ARMY	0	0	0	150	0	0	0	0	0	1.65
0313	HOODS	12		ARMY	0	0	0	600	0	0	0	0	0	6.60
0313	HEATERS	5		ARMY	0	0	0	250	0	0	0	0	0	1.38
0313	PUMP	6		ARMY	0	0	0	300	0	0	0	0	0	1.65
0313	HEAT EXCHANGER	1		ARMY	0			150	0	0	0	0	0	1.65
0314	BLOWER, CENTRIFUGAL	1		ARMY	0	0	0	200	0	0	0	0	0	2.20
0314	COMPRESSOR	1		ARMY	0	0	0	200	0	0	0	0	0	2.20
0314	FLAMMABLE CABINATE	1		ARMY	0	0	0	200	0	0	0	0	0	2.20
0314	HEATING UNITS	2		ARMY	0	0	0	400	0	0	0	0	0	4.40
0314	MOTOR	1		ARMY	0	0	0	100	0	0	0	0	0	1.10
0314	TANK, WATER HEATER, 2000 GAL	1		ARMY	0	0	0	2500	0	0	0	0	0	27.50
0314	TOLEDO SCALE, 1-1000 LB	2		ARMY	0	0	0	1000	0	0	0	0	0	11.00
0314	WASHER, EXTRACTOR	2		ARMY	0	0	1000	0	0	0	0	0	0	150.00
0315	HEATING UNITS	3		ARMY	0	0	0	600	0	0	0	0	0	6.60
0315	MOTORS, 1/8 HP	3		ARMY	0	0	0	150	0	0	0	0	0	1.65
0409	MOTOR	2		ARMY	0	0	0	100	0	0	0	0	0	1.10
0409	PUMP	2		ARMY	0	0	0	100	0	0	0	0	0	1.10
0409	TANK	1		ARMY	0	0	0	200	0	0	0	0	0	2.20

Notes:

AL = aluminum weight
BLDG = building
CAST = cast iron
CST = carbon steel
CU = copper
GAL = gallons
HAST = hasteloy
HP = horsepower
LB = pounds
NICK = nickel
STLES = stainless
TITAN = titanium
UNSAL = unsalvageable

TABLE 3-22
STRUCTURES IN THE SOUTH PLANTS
NORTHERN TIER PRODUCTION AREA
ROCKY MOUNTAIN ARSENAL

BUILDING	FACILITY	CONTAMINATION	ASSOCIATED AST	ASSOCIATED UST	VOLUME OF EQUIPMENT EXISTING (yd^3)	VOLUME OF PIPING EXISTING (yd^3)	PCB TRANSFORMERS	MERCURY	ACM	PCB YTAG	PCB BTAG
0539	Electrical Substation Building	HISTORICAL: None	0	0	2	0	N	N	Y	0	9
NN0110	Metal Shed-South of 521B	Not Available	0	0	1	0	N	NS	Y	NSR	NSR
NN0112	Stack Observation Station-East of 527	Not Available	0	0	2	0	N	N	Y	NSR	NSR

Notes:

ACM = asbestos-containing materials
AST = aboveground storage tank
BTAG = blue tag, <50ppm or < 10 $\mu g/100\ cm^2$ or nondetect
N = no
NS = not sampled
NSR = need sample results
PCB = polychlorinated biphenyl
PCB YTAG = # pieces of equipment w/a YTAG.
PCB BTAG = # pieces of equipment w/a BTAG.
UST = underground storage tank
Y = yes
yd^3 = cubic yards
YTAG = yellow tag, >50ppm or > 10 $\mu g/100\ cm^2$

TABLE 3-23
DETECTION OF ANALYTES IN SAMPLES TAKEN IN THE NORTHERN TIER PRODUCTION AREA
ROCKY MOUNTAIN ARSENAL

PIPERUN	LOCATION	HISTORICAL DESCRIPTION	SAMPLE_NO	ANALYTE	CAS_NO	UNITS	MATRIX	CONC	DET_LIMIT
	Flange on pipe that connects tanks T158, T159, and T152.		571B	ARSENIC	7740-38-2	mg/kg	WIPE	<0.32	0.10
	Flange on pipe that connects tanks T158, T159, and T152.		571B	CADMIUM	7440-43-9	mg/kg	WIPE	0.51	0.50
	Flange on pipe that connects tanks T158, T159, and T152.		571B	CHROMIUM	7440-47-3	mg/kg	WIPE	3.60	0.50
	Flange on pipe that connects tanks T158, T159, and T152.		571B	COPPER	7440-50-8	mg/kg	WIPE	5.00	0.50
	Flange on pipe that connects tanks T158, T159, and T152.		571B	LEAD	7439-92-1	mg/kg	WIPE	0.96	3.0
	Flange on pipe that connects tanks T158, T159, and T152.		571B	ZINC	7740-66-6	mg/kg	WIPE	15.60	0.50
	Flange on pipe that connects tanks T158, T159, and T152.		571B	ALDRIN	309-00-2	µg/cm²	WIPE	.10E-2	.20E-3
	Flange on pipe that connects tanks T158, T159, and T152.		571B	DIELDRIN	60-57-1	µg/cm²	WIPE	.10E-2	.20E-3
	Flange on pipe that connects tanks T158, T159, and T152.		571B	ENDRIN	72-20-8	µg/cm²	WIPE	.30E-3	.20E-3
	Flange on pipe that connects tanks T158, T159, and T152.		571B	4,4'-DDT	50-29-8	µg/cm²	WIPE	.20E-3	.20E-3
	Hopper in Bldg. 724 immediately to the right inside the door.		724 (001)	ARSENIC	7740-38-2	mg/kg	SOIL	4.80	0.10
	Hopper in Bldg. 724 immediately to the right inside the door.		724 (001)	CADMIUM	7440-43-9	mg/kg	SOIL	5.00	0.50
	Hopper in Bldg. 724 immediately to the right inside the door.		724 (001)	CHROMIUM	7440-47-3	mg/kg	SOIL	37.90	0.50
	Hopper in Bldg. 724 immediately to the right inside the door.		724 (001)	COPPER	7440-50-8	mg/kg	SOIL	28.50	0.50
	Hopper in Bldg. 724 immediately to the right inside the door.		724 (001)	LEAD	7439-92-1	mg/kg	SOIL	127.00	3.0
	Hopper in Bldg. 724 immediately to the right inside the door.		724 (001)	MERCURY	7439-97-6	mg/kg	SOIL	<0.079	0.067
	Hopper in Bldg. 724 immediately to the right inside the door.		724 (001)	ZINC	7740-66-6	mg/kg	SOIL	237.00	0.50
	Hopper in Bldg. 724 immediately to the right inside the door.		724 (001)	DIELDRIN	60-57-1	µg/kg	SOIL	7.70	3.10
	Hopper in Bldg. 724 immediately to the right inside the door.		724 (001)	METHYLENE CHLORIDE	75-09-2	µg/kg	SOIL	1000.00	26.00
	Pipe on east side and bottom of tank V-1257 in Bldg. 724.		724 (002)	ARSENIC	7740-38-2	mg/kg	GRAB	20.50	0.10

TABLE 3-23
DETECTION OF ANALYTES IN SAMPLES TAKEN IN THE NORTHERN TIER PRODUCTION AREA
ROCKY MOUNTAIN ARSENAL

PIPERUN	LOCATION	HISTORICAL DESCRIPTION	SAMPLE_NO	ANALYTE	CAS_NO	UNITS	MATRIX	CONC	DET_LIMIT
	Pipe on east side and bottom of tank V-1257 in Bldg. 724.		724 (002)	CADMIUM	7440-43-9	mg/kg	GRAB	7.30	0.50
	Pipe on east side and bottom of tank V-1257 in Bldg. 724.		724 (002)	CHROMIUM	7440-47-3	mg/kg	GRAB	147.00	0.50
	Pipe on east side and bottom of tank V-1257 in Bldg. 724.		724 (002)	COPPER	7440-50-8	mg/kg	GRAB	466.00	0.50
	Pipe on east side and bottom of tank V-1257 in Bldg. 724.		724 (002)	LEAD	7439-92-1	mg/kg	GRAB	122.00	3.0
	Pipe on east side and bottom of tank V-1257 in Bldg. 724.		724 (002)	MERCURY	7439-97-6	mg/kg	GRAB	0.39	0.067
	Pipe on east side and bottom of tank V-1257 in Bldg. 724.		724 (002)	ZINC	7740-66-6	mg/kg	GRAB	577.00	0.50
	Pipe on east side and bottom of tank V-1257 in Bldg. 724.		724 (002)	METHYLENE CHLORIDE	75-09-2	µg/kg	GRAB	3400.00	730.00
J10		UNKNOWN	06-35-36	ARSENIC	7740-38-2	mg/kg	WIPE	<0.66	0.10
J10		UNKNOWN	06-35-36	CADMIUM	7440-43-9	mg/kg	WIPE	0.95	0.50
J10		UNKNOWN	06-35-36	CHROMIUM	7440-47-3	mg/kg	WIPE	0.58	0.50
J10		UNKNOWN	06-35-36	COPPER	7440-50-8	mg/kg	WIPE	2.40	0.50
J10		UNKNOWN	06-35-36	LEAD	7439-92-1	mg/kg	WIPE	<0.40	3.0
J10		UNKNOWN	06-35-36	ZINC	7740-66-6	mg/kg	WIPE	5.60	0.50
J10		UNKNOWN	06-35-35	ARSENIC	7740-38-2	mg/kg	WIPE	<0.55	0.10
J10		UNKNOWN	06-35-35	CADMIUM	7440-43-9	mg/kg	WIPE	0.08	0.50
J10		UNKNOWN	06-35-35	CHROMIUM	7440-47-3	mg/kg	WIPE	0.81	0.50
J10		UNKNOWN	06-35-35	COPPER	7440-50-8	mg/kg	WIPE	3.60	0.50
J10		UNKNOWN	06-35-35	LEAD	7439-92-1	mg/kg	WIPE	0.84	3.0
J10		UNKNOWN	06-35-35	ZINC	7740-66-6	mg/kg	WIPE	9.40	0.50
J12		PROCESS VENT	06-32-34	ARSENIC	7740-38-2	mg/kg	GRAB	5.50	0.10
J12		PROCESS VENT	06-32-34	CADMIUM	7440-43-9	mg/kg	GRAB	<0.83	0.50
J12		PROCESS VENT	06-32-34	CHROMIUM	7440-47-3	mg/kg	GRAB	452.00	0.50
J12		PROCESS VENT	06-32-34	COPPER	7440-50-8	mg/kg	GRAB	4800.00	0.50
J12		PROCESS VENT	06-32-34	LEAD	7439-92-1	mg/kg	GRAB	23.40	3.0
J12		PROCESS VENT	06-32-34	MERCURY	7439-97-6	mg/kg	GRAB	14.00	0.067
J12		PROCESS VENT	06-32-34	ZINC	7740-66-6	mg/kg	GRAB	56.20	0.50
J12		PROCESS VENT	06-32-34	DIMETHYL DISULFIDE	624-92-0	µg/kg	GRAB	20000.0	680.00
J12		PROCESS VENT	06-32-34	1,4-DICHLOROBENZENE	106-46-7	µg/kg	GRAB	1300.00	340.00
J12		PROCESS VENT	06-32-34	1,2-DICHLOROBENZENE	95-50-1	µg/kg	GRAB	820.00	340.00
J12		PROCESS VENT	06-32-34	1,2,4-TRICHLOROBENZENE	120-82-1	µg/kg	GRAB	83.00	340.00
J12		PROCESS VENT	06-32-34	p-CHLOROPHENYLMETHYL SULFIDE	123-09-1	µg/kg	GRAB	300.00	680.00
J12		PROCESS VENT	06-32-34	2-METHYLNAPHTHALENE	91-57-6	µg/kg	GRAB	82.00	340.00
J12		PROCESS VENT	06-32-34	METHYLENE CHLORIDE	75-09-2	µg/kg	GRAB	4100.00	1300.00
J12		PROCESS VENT	06-32-34	METHYLPENTANONE	108-10-1	µg/kg	GRAB	40000.0	5200.00
J15		UNKNOWN	6-28-58	ARSENIC	7740-38-2	mg/kg	WIPE	<0.33	0.10
J15		UNKNOWN	6-28-58	CADMIUM	7440-43-9	mg/kg	WIPE	0.24	0.50
J15		UNKNOWN	6-28-58	CHROMIUM	7440-47-3	mg/kg	WIPE	1.10	0.50
J15		UNKNOWN	6-28-58	COPPER	7440-50-8	mg/kg	WIPE	12.70	0.50
J15		UNKNOWN	6-28-58	LEAD	7439-92-1	mg/kg	WIPE	0.80	3.0
J15		UNKNOWN	6-28-58	ZINC	7740-66-6	mg/kg	WIPE	2.40	0.50
J15		UNKNOWN	6-28-56	ARSENIC	7740-38-2	mg/kg	WIPE	<0.35	0.10
J15		UNKNOWN	6-28-56	CADMIUM	7440-43-9	mg/kg	WIPE	0.12	0.50
J15		UNKNOWN	6-28-56	CHROMIUM	7440-47-3	mg/kg	WIPE	6.90	0.50
J15		UNKNOWN	6-28-56	COPPER	7440-50-8	mg/kg	WIPE	2.50	0.50
J15		UNKNOWN	6-28-56	LEAD	7439-92-1	mg/kg	WIPE	1.50	3.0
J15		UNKNOWN	6-28-56	ZINC	7740-66-6	mg/kg	WIPE	40.80	0.50
J15		UNKNOWN	6-28-59	ARSENIC	7740-38-2	mg/kg	WIPE	<0.37	0.10
J15		UNKNOWN	6-28-59	CADMIUM	7440-43-9	mg/kg	WIPE	0.24	0.50
J15		UNKNOWN	6-28-59	CHROMIUM	7440-47-3	mg/kg	WIPE	3.40	0.50
J15		UNKNOWN	6-28-59	COPPER	7440-50-8	mg/kg	WIPE	1.10	0.50
J15		UNKNOWN	6-28-59	LEAD	7439-92-1	mg/kg	WIPE	1.20	3.0
J15		UNKNOWN	6-28-59	ZINC	7740-66-6	mg/kg	WIPE	27.00	0.50
J15		SO_2	6-28-57	ARSENIC	7740-38-2	mg/kg	WIPE	3.60	0.10
J15		SO_2	6-28-57	CADMIUM	7440-43-9	mg/kg	WIPE	0.71	0.50
J15		SO_2	6-28-57	CHROMIUM	7440-47-3	mg/kg	WIPE	24.50	0.50
J15		SO_2	6-28-57	COPPER	7440-50-8	mg/kg	WIPE	52.20	0.50
J15		SO_2	6-28-57	LEAD	7439-92-1	mg/kg	WIPE	11.10	3.0
J15		SO_2	6-28-57	ZINC	7740-66-6	mg/kg	WIPE	16.90	0.50
J15		SO_2	6-28-57	METHYLENE CHLORIDE	75-09-2	µg/L	GRAB	680.00	50.00
J15		SO_2	6-28-57	PENTANONE	107-87-9	µg/L	GRAB	33.00	20.00

TABLE 3-23
DETECTION OF ANALYTES IN SAMPLES TAKEN IN THE NORTHERN TIER PRODUCTION AREA
ROCKY MOUNTAIN ARSENAL

PIPERUN	LOCATION	HISTORICAL DESCRIPTION	SAMPLE_NO	ANALYTE	CAS_NO	UNITS	MATRIX	CONC	DET_LIMIT
J15		SO_2	6-28-57	METHYLPENTANONE	108-10-1	µg/L	GRAB	12.00	20.00
J3		UNKNOWN	6-29-60	ARSENIC	7740-38-2	mg/kg	WIPE	<0.35	0.10
J3		UNKNOWN	6-29-60	CADMIUM	7440-43-9	mg/kg	WIPE	0.32	0.50
J3		UNKNOWN	6-29-60	CHROMIUM	7440-47-3	mg/kg	WIPE	2.00	0.50
J3		UNKNOWN	6-29-60	COPPER	7440-50-8	mg/kg	WIPE	1.30	0.50
J3		UNKNOWN	6-29-60	LEAD	7439-92-1	mg/kg	WIPE	0.56	3.0
J3		UNKNOWN	6-29-60	ZINC	7740-66-6	mg/kg	WIPE	9.00	0.50
J54		EFFLUENT	06-40-42	ARSENIC	7740-38-2	mg/kg	WIPE	0.44	0.10
J54		EFFLUENT	06-40-42	CADMIUM	7440-43-9	mg/kg	WIPE	<0.40	0.50
J54		EFFLUENT	06-40-42	CHROMIUM	7440-47-3	mg/kg	WIPE	3.70	0.50
J54		EFFLUENT	06-40-42	COPPER	7440-50-8	mg/kg	WIPE	28.20	0.50
J54		EFFLUENT	06-40-42	LEAD	7439-92-1	mg/kg	WIPE	<3.0	3.0
J54		EFFLUENT	06-40-42	MERCURY	7439-97-6	mg/kg	WIPE	0.83	0.067
J54		EFFLUENT	06-40-42	ZINC	7740-66-6	mg/kg	WIPE	9.80	0.50
J54		EFFLUENT	06-40-42	ALDRIN	309-00-2	µg/cm²	WIPE	.20E-3	.20E-3
J54		EFFLUENT	06-40-42	DIELDRIN	60-57-1	µg/cm²	WIPE	.90E-3	.20E-3
J54		EFFLUENT	06-40-42	ENDRIN	72-20-8	µg/cm²	WIPE	.20E-3	.20E-3
J54		UNKNOWN	6-40-41	ARSENIC	7740-38-2	mg/kg	GRAB	6.10	0.10
J54		UNKNOWN	6-40-41	CADMIUM	7440-43-9	mg/kg	GRAB	1.50	0.50
J54		UNKNOWN	6-40-41	CHROMIUM	7440-47-3	mg/kg	GRAB	82.10	0.50
J54		UNKNOWN	6-40-41	COPPER	7440-50-8	mg/kg	GRAB	1130.00	0.50
J54		UNKNOWN	6-40-41	LEAD	7439-92-1	mg/kg	GRAB	163.00	3.0
J54		UNKNOWN	6-40-41	MERCURY	7439-97-6	mg/kg	GRAB	3.80	0.067
J54		UNKNOWN	6-40-41	ZINC	7740-66-6	mg/kg	GRAB	108.00	0.50
J54		UNKNOWN	6-40-41	ALDRIN	309-00-2	µg/kg	GRAB	9600.00	32000
J54		UNKNOWN	6-40-41	DIELDRIN	60-57-1	µg/kg	GRAB	16000.0	16000
J54		UNKNOWN	6-40-41	ENDRIN	72-20-8	µg/kg	GRAB	1700.00	49000
J54		UNKNOWN	6-40-41	1,3-DICHLOROBENZENE	541-73-1	µg/kg	GRAB	64.00	350
J54		UNKNOWN	6-40-41	1,4-DICHLOROBENZENE	106-46-7	µg/kg	GRAB	2400.00	350
J54		UNKNOWN	6-40-41	1,2-DICHLOROBENZENE	95-50-1	µg/kg	GRAB	2500.00	350
J54		UNKNOWN	6-40-41	1,2,4-TRICHLOROBENZENE	120-82-1	µg/kg	GRAB	1600.00	350
J54		UNKNOWN	6-40-41	HEXACHLOROBUTADIENE	87-68-3	µg/kg	GRAB	120.00	350
J54		UNKNOWN	6-40-41	p-CHLOROPHENYLMETHYL SULFIDE	123-09-1	µg/kg	GRAB	3000.00	690
J54		UNKNOWN	6-40-41	2-METHYLNAPHTHALENE	91-57-6	µg/kg	GRAB	860.00	450
J54		UNKNOWN	6-40-41	p-CHLOROPHENYLMETHYL SULFOXIDE	934-73-6	µg/kg	GRAB	7600.00	14000
J54		UNKNOWN	6-40-41	p-CHLOROPHENYLMETHYL SULFONE	98-57-7	µg/kg	GRAB	25000.0	14000
J54		UNKNOWN	6-40-41	PHENANTHRENE	85-01-8	µg/kg	GRAB	660.00	350
J54		UNKNOWN	6-40-41	FLUORANTHENE	206-44-0	µg/kg	GRAB	180.00	350
J54		UNKNOWN	6-40-41	PYRENE	129-00-0	µg/kg	GRAB	140.00	350
J54		UNKNOWN	6-40-41	METHYLPENTANONE	108-10-1	µg/kg	GRAB	250000	26000
J55		CHEM SEWER	06-38-40 (00)	ARSENIC	7740-38-2	mg/kg	WIPE(D)	<0.1	0.10
J55		CHEM SEWER	06-38-40 (00)	CADMIUM	7440-43-9	mg/kg	WIPE(D)	2.50	0.50
J55		CHEM SEWER	06-38-40 (00)	CHROMIUM	7440-47-3	mg/kg	WIPE(D)	0.69	0.50
J55		CHEM SEWER	06-38-40 (00)	COPPER	7440-50-8	mg/kg	WIPE(D)	1.90	0.50
J55		CHEM SEWER	06-38-40 (00)	LEAD	7439-92-1	mg/kg	WIPE(D)	<3.0	3.0
J55		CHEM SEWER	06-38-40 (00)	MERCURY	7439-97-6	mg/kg	WIPE(D)	0.064	0.067
J55		CHEM SEWER	06-38-40 (00)	ZINC	7740-66-6	mg/kg	WIPE(D)	6.70	0.50
J55		CHEM SEWER	06-38-40 (00)	DIELDRIN	60-57-1	µg/cm²	WIPE(D)	.40E-3	.20E-3
J55		CHEM SEWER	06-38-40 (00)	ARSENIC	7740-38-2	mg/kg	WIPE(D)	<0.10	0.10
J55		CHEM SEWER	06-38-40 (00)	CADMIUM	7440-43-9	mg/kg	WIPE(D)	<0.40	0.50
J55		CHEM SEWER	06-38-40 (00)	CHROMIUM	7440-47-3	mg/kg	WIPE(D)	<0.50	0.50
J55		CHEM SEWER	06-38-40 (00)	COPPER	7440-50-8	mg/kg	WIPE(D)	<0.50	0.50
J55		CHEM SEWER	06-38-40 (00)	LEAD	7439-92-1	mg/kg	WIPE(D)	<3.0	3.0
J55		CHEM SEWER	06-38-40 (00)	MERCURY	7439-97-6	mg/kg	WIPE(D)	0.16	0.067
J55		CHEM SEWER	06-38-40 (00)	ZINC	7740-66-6	mg/kg	WIPE(D)	2.10	0.50
J55		CHEM SEWER	06-38-40 (00)	DIELDRIN	60-57-1	µg/cm²	WIPE(D)	.90E-3	.20E-3
J56		UNKNOWN	06-36-36	ARSENIC	7740-38-2	mg/kg	WIPE	0.90	0.10
J56		UNKNOWN	06-36-36	CADMIUM	7440-43-9	mg/kg	WIPE	0.57	0.50
J56		UNKNOWN	06-36-36	CHROMIUM	7440-47-3	mg/kg	WIPE	31.80	0.50
J56		UNKNOWN	06-36-36	COPPER	7440-50-8	mg/kg	WIPE	83.20	0.50
J56		UNKNOWN	06-36-36	LEAD	7439-92-1	mg/kg	WIPE	6.70	3.0
J56		UNKNOWN	06-36-36	MERCURY	7439-97-6	mg/kg	WIPE	268.00	0.067
J56		UNKNOWN	06-36-36	ZINC	7740-66-6	mg/kg	WIPE	27.60	0.50
J56		UNKNOWN	06-36-36	ALDRIN	309-00-2	µg/cm²	WIPE	0.01	0.02
J56		UNKNOWN	06-36-36	DIELDRIN	60-57-1	µg/cm²	WIPE	0.02	0.02
J56		UNKNOWN	06-36-36	ENDRIN	72-20-8	µg/cm²	WIPE	.20E-3	0.02
J56		UNKNOWN	06-36-36	ATRAZINE	1912-24-9	µg/cm²	WIPE	0.02	.39E-2
J59		EFFLUENT	06-37-37	ARSENIC	7740-38-2	mg/kg	WIPE	<0.52	0.10
J59		EFFLUENT	06-37-37	CADMIUM	7440-43-9	mg/kg	WIPE	0.18	0.50
J59		EFFLUENT	06-37-37	CHROMIUM	7440-47-3	mg/kg	WIPE	17.70	0.50
J59		EFFLUENT	06-37-37	COPPER	7440-50-8	mg/kg	WIPE	93.50	0.50
J59		EFFLUENT	06-37-37	LEAD	7439-92-1	mg/kg	WIPE	8.20	3.0
J59		EFFLUENT	06-37-37	ZINC	7740-66-6	mg/kg	WIPE	13.30	0.50
J59		EFFLUENT	06-37-37	ALDRIN	309-00-2	µg/cm²	WIPE	.50E-3	0.0002
J59		EFFLUENT	06-37-38	ARSENIC	7740-38-2	mg/kg	WIPE	<0.10	0.10
J59		EFFLUENT	06-37-38	CADMIUM	7440-43-9	mg/kg	WIPE	<0.50	0.50
J59		EFFLUENT	06-37-38	CHROMIUM	7440-47-3	mg/kg	WIPE	1.40	0.50
J59		EFFLUENT	06-37-38	COPPER	7440-50-8	mg/kg	WIPE	8.90	0.50
J59		EFFLUENT	06-37-38	LEAD	7439-92-1	mg/kg	WIPE	<3.0	3.0
J59		EFFLUENT	06-37-38	MERCURY	7439-97-6	mg/kg	WIPE	0.14	0.067
J59		EFFLUENT	06-37-38	ZINC	7740-66-6	mg/kg	WIPE	4.90	0.50
J59		EFFLUENT	06-37-38	DIELDRIN	60-57-1	µg/cm²	WIPE	.40E-2	.20E-2

TABLE 3-23
DETECTION OF ANALYTES IN SAMPLES TAKEN IN THE NORTHERN TIER PRODUCTION AREA
ROCKY MOUNTAIN ARSENAL

PIPERUN	LOCATION	HISTORICAL DESCRIPTION	SAMPLE_NO	ANALYTE	CAS_NO	UNITS	MATRIX	CONC	DET_LIMIT
	Valve located at low spot on west side of filling station, NN106		NN106 WEST	ARSENIC	7740-38-2	mg/kg	WIPE	<0.33	0.10
	Valve located at low spot on west side of filling station, NN106		NN106 WEST	CADMIUM	7440-43-9	mg/kg	WIPE	0.15	0.50
	Valve located at low spot on west side of filling station, NN106		NN106 WEST	CHROMIUM	7440-47-3	mg/kg	WIPE	2.20	0.50
	Valve located at low spot on west side of filling station, NN106		NN106 WEST	COPPER	7440-50-8	mg/kg	WIPE	115.00	0.50
	Valve located at low spot on west side of filling station, NN106		NN106 WEST	LEAD	7439-92-1	mg/kg	WIPE	8.70	3.0
	Valve located at low spot on west side of filling station, NN106		NN106 WEST	ZINC	7740-66-6	mg/kg	WIPE	7.70	0.50
	Valve located at low spot on west side of filling station, NN106		NN106 WEST	DIELDRIN	60-57-1	µg/cm²	WIPE	.20E-2	.40E-2
	Valve located at low spot on east side of filling station, NN106		NN106 EAST	ARSENIC	7740-38-2	mg/kg	WIPE	0.66	0.10
	Valve located at low spot on east side of filling station, NN106		NN106 EAST	CADMIUM	7440-43-9	mg/kg	WIPE	1.60	0.50
	Valve located at low spot on east side of filling station, NN106		NN106 EAST	CHROMIUM	7440-47-3	mg/kg	WIPE	22.20	0.50
	Valve located at low spot on east side of filling station, NN106		NN106 EAST	COPPER	7440-50-8	mg/kg	WIPE	88.00	0.50
	Valve located at low spot on east side of filling station, NN106		NN106 EAST	LEAD	7439-92-1	mg/kg	WIPE	1.30	3.0
	Valve located at low spot on east side of filling station, NN106		NN106 EAST	ZINC	7740-66-6	mg/kg	WIPE	21.70	0.50
	Valve located at low spot on east side of filling station, NN106		NN106 EAST	DIELDRIN	60-57-1	µg/cm²	WIPE	.20E-3	0.0002
	Valve located at low spot on west side of filling station, NN106		NN106 WEST	ARSENIC	7740-38-2	mg/L	GRAB	<0.0050	0.0010
	Valve located at low spot on west side of filling station, NN106		NN106 WEST	CADMIUM	7440-43-9	mg/L	GRAB	<0.0040	0.0050
	Valve located at low spot on west side of filling station, NN106		NN106 WEST	CHROMIUM	7440-47-3	mg/L	GRAB	<0.0050	0.0050
	Valve located at low spot on west side of filling station, NN106		NN106 WEST	COPPER	7440-50-8	mg/L	GRAB	<0.0050	0.0050
	Valve located at low spot on west side of filling station, NN106		NN106 WEST	LEAD	7439-92-1	mg/L	GRAB	<0.030	0.030

TABLE 3-23
DETECTION OF ANALYTES IN SAMPLES TAKEN IN THE NORTHERN TIER PRODUCTION AREA
ROCKY MOUNTAIN ARSENAL

PIPERUN	LOCATION	HISTORICAL DESCRIPTION	SAMPLE_NO	ANALYTE	CAS_NO	UNITS	MATRIX	CONC	DET_LIMIT
	Valve located at low spot on west side of filling station, NN106		NN106 WEST	MERCURY	7439-97-6	mg/L	GRAB	<0.0002	0.00020
	Valve located at low spot on west side of filling station, NN106		NN106 WEST	ZINC	7740-66-6	mg/L	GRAB	0.011	0.0050
	Valve located at low spot on west side of filling station, NN106		NN106 WEST	METHYLENE CHLORIDE	75-09-2	µg/L	GRAB	72.00	5.00
J64		UNKNOWN	3-1-23	ARSENIC	7740-38-2	mg/kg	WIPE	<0.37	0.10
J64		UNKNOWN	3-1-23	CADMIUM	7440-43-9	mg/kg	WIPE	0.18	0.50
J64		UNKNOWN	3-1-23	CHROMIUM	7440-47-3	mg/kg	WIPE	1.90	0.50
J64		UNKNOWN	3-1-23	COPPER	7440-50-8	mg/kg	WIPE	6.20	0.50
J64		UNKNOWN	3-1-23	LEAD	7439-92-1	mg/kg	WIPE	0.86	3.0
J64		UNKNOWN	3-1-23	ZINC	7740-66-6	mg/kg	WIPE	3.20	0.50
J64		UNKNOWN	3-1-24	ARSENIC	7740-38-2	mg/kg	WIPE	<0.34	0.10
J64		UNKNOWN	3-1-24	CADMIUM	7440-43-9	mg/kg	WIPE	0.13	0.50
J64		UNKNOWN	3-1-24	CHROMIUM	7440-47-3	mg/kg	WIPE	6.00	0.50
J64		UNKNOWN	3-1-24	COPPER	7440-50-8	mg/kg	WIPE	9.10	0.50
J64		UNKNOWN	3-1-24	LEAD	7439-92-1	mg/kg	WIPE	2.00	3.0
J64		UNKNOWN	3-1-24	ZINC	7740-66-6	mg/kg	WIPE	5.20	0.50
J64		UNKNOWN	3-1-22	ARSENIC	7740-38-2	mg/kg	WIPE	<0.35	0.10
J64		UNKNOWN	3-1-22	CADMIUM	7440-43-9	mg/kg	WIPE	0.05	0.50
J64		UNKNOWN	3-1-22	CHROMIUM	7440-47-3	mg/kg	WIPE	0.39	0.50
J64		UNKNOWN	3-1-22	COPPER	7440-50-8	mg/kg	WIPE	33.90	0.50
J64		UNKNOWN	3-1-22	LEAD	7439-92-1	mg/kg	WIPE	525.00	3.0
J64		UNKNOWN	3-1-22	ZINC	7740-66-6	mg/kg	WIPE	7.20	0.50
P-1		UNKNOWN	6-P-153	ARSENIC	7740-38-2	mg/kg	WIPE	1.00	0.10
P-1		UNKNOWN	6-P-153	CADMIUM	7440-43-9	mg/kg	WIPE	0.053	0.50
P-1		UNKNOWN	6-P-153	CHROMIUM	7440-47-3	mg/kg	WIPE	1.60	0.50
P-1		UNKNOWN	6-P-153	COPPER	7440-50-8	mg/kg	WIPE	1.80	0.50
P-1		UNKNOWN	6-P-153	LEAD	7439-92-1	mg/kg	WIPE	0.37	3.0
P-1		UNKNOWN	6-P-153	ZINC	7740-66-6	mg/kg	WIPE	3.40	0.50
P-2		FILL LINE	6-P-2-54	ARSENIC	7740-38-2	mg/kg	WIPE	<1.6	0.10
P-2		FILL LINE	6-P-2-54	CADMIUM	7440-43-9	mg/kg	WIPE	<0.12	0.50
P-2		FILL LINE	6-P-2-54	CHROMIUM	7440-47-3	mg/kg	WIPE	21.80	0.50
P-2		FILL LINE	6-P-2-54	COPPER	7440-50-8	mg/kg	WIPE	11.80	0.50
P-2		FILL LINE	6-P-2-54	LEAD	7439-92-1	mg/kg	WIPE	4.50	3.0
P-2		FILL LINE	6-P-2-54	ZINC	7740-66-6	mg/kg	WIPE	8.60	0.50
RR1		UNKNOWN	3-5-21	ARSENIC	7740-38-2	mg/kg	WIPE	1.00	0.10
RR1		UNKNOWN	3-5-21	CADMIUM	7440-43-9	mg/kg	WIPE	0.053	0.50
RR1		UNKNOWN	3-5-21	CHROMIUM	7440-47-3	mg/kg	WIPE	1.60	0.50
RR1		UNKNOWN	3-5-21	COPPER	7440-50-8	mg/kg	WIPE	1.80	0.50
RR1		UNKNOWN	3-5-21	LEAD	7439-92-1	mg/kg	WIPE	0.37	3.0
RR1		UNKNOWN	3-5-21	ZINC	7740-66-6	mg/kg	WIPE	3.40	0.50
RR1		UNKNOWN	3-5-21	METHYLENE CHLORIDE	75-09-2	µg/L	GRAB	6900.00	250.00
RR1		UNKNOWN	3-5-21	ETHYLBENZENE	100-41-4	µg/L	GRAB	510.00	500.00
RR1		UNKNOWN	3-5-21	M-XYLENE	108-38-3	µg/L	GRAB	1600.00	250.00
RR1		UNKNOWN	3-5-21	O&P-XYLENE	106-42-3	µg/L	GRAB	1800.00	250.00
RR1		UNKNOWN	3-5-21	TOLUENE	108-88-3	µg/L	GRAB	12	5

NOTES:

CAS_NO = chemical abstracts system number
CONC = concentration detected
D = duplicate
DDT = dichlorodiphenyltrichloroethane
DET_LIMIT = detection limit
mg/kg = milligrams per kilogram
SAMPLE_NO = sample number
SO_2 = sulfur dioxide
$\mu g/cm^2$ = micrograms per square centimeters
µg/kg = micrograms per kilogram
µg/L = micrograms per liter

TABLE 3-24
UNDERGROUND STORAGE TANKS IN THE SOUTH PLANTS
NORTHERN TIER PRODUCTION AREA
ROCKY MOUNTAIN ARSENAL

BPRE	BLDG	TPRE	TANK	FACILITY	LOCATION	SHELL	TYPE	CAPACITY (GAL)	ST_MATERIAL	LAST KNOWN CONTENTS
	0502	T	0002	WEST CHEMICAL METERING PUMP	TANK 0002 IS NEXT TO BLDG 502	Y	UST/SUMP	3,340	CONCRETE	PROBABLY EFFLUENT FOR DET
	0502	T	0001	WEST CHEMICAL METERING PUMP	TANK 0001 IS DIRECTLY WEST OF BUILDING 502	Y	UST/SUMP	4,300	CONCRETE	EFFLUENT
	0503	T	0001	EAST CHEMICAL METERING PUMP	T0001 IS NEXT TO BUILDING 503. BUILDING 503 IS 75 FEET SOUTH OF DEC. 7TH AVENUE, 1200 FEET EAST OF D STREET, WEST OF BUILDING 504A	Y	UST/SUMP	4,230	BRICK/CONCRETE	EFFLUENT FROM SHELL OPERATIONS
	0503	T	0002	EAST CHEMICAL METERING PUMP	SUMP 0002/UST IS LOCATED 20 FEET EAST OF BLDG 503	Y	UST/SUMP	4,000	CONCRETE	PROBABLY EFFLUENT
	0571B	T	1587	TANK ROOM	TANK 1587 IS WEST OF BLDG 571B BY 20 FEET AND NORTHWEST OF V1303 BY 14 FEET	Y	UST/SUMP	~3,000	STEEL	UNKNOWN; PROBABLY HAZARDOUS WASTE
	0521	T	1586	ACETYLENE COMPRESSOR/PESTICIDE MFG	T1586 IS LOCATED ~6 FEET SOUTHWEST OF BLDG 512, ~18 FEET SOUTHEAST OF 525	Y	UST/SUMP	6,662	STEEL	UNKNOWN
	0529	T	1580	NaOH MAKEUP/AZODRIN SUPPORT STRUC	T1580 IS LOCATED 10 FEET NORTHWEST OF BLDG 529	Y	UST	2,750	STEEL	UNKNOWN
	0534B	T	0001	PLANAVIN MANUFACTURE	TANK 0001 IS OUTSIDE OF BLDG 534B ALONG THE NORTH WALL. BLDG 534B IS 260 FEET SOUTH OF DEC. 7TH AVENUE, 380 FEET EAST OF BLDG 531 AND NORTH OF BLDG 543B	Y	UST/SUMP	3,200	CONCRETE	SPENT ACID
	0537A	T	0001	CONDENSATE PUMP PIT	T0001 IS LOCATED WEST OF THE SOUTHWEST CORNER OF BLDG 537	N	UST	2,872	CONCRETE	UNKNOWN (SEE MISCELLANEOUS)
NN	0102A	NN	0102A	EFFLUENT METERING STATION, ARMY	SUMP/UST 0001 IS LOCATED APPROXIMATELY 30 FEET NORTH OF TANK FARM 0101 CONCRETE DIKE	N	UST/SUMP	3,000	CONCRETE	EFFLUENT BEING DISCHARGED TO BASIN F
NN	0103D	NN	0103D	CONCRETE VAULT	T0001 IS SOUTHWEST OF TANK 0065	N	UST/VAULT	1,650	CONCRETE	UNKNOWN
TF	0102	T	1591	515 TANK FARM, SHELL	T1591 IS NORTH OF V1230, EAST OF T0014	Y	UST/SUMP	500	STEEL	UNKNOWN
TF	0104	T	0001	514 TANK FARM	T0001 IS LOCATED BETWEEN T1148 AND T1246	Y	UST/SUMP	10,000	CONCRETE	UNKNOWN
TF	0105	T	0003	DET SYSTEM TANKS, SHELL	T0003 IS NORTH OF T1514	Y	UST/SUMP	INA	UNKNOWN	PROBABLY HAZARDOUS WASTE

Notes:

BLDG = building
BPRE = building prefix
CHLOR. = chlorinated
CSS = chemical sewer system
DET = Denver Effluent Treatment
GAL = gallons
HD = distilled mustard
INA = information not available
L = lewisite
MFG = manufacturing
N = no
N. = northern
NaOH = sodium hydroxide
NN = no number
PEST. = pesticide
PROD. = production
ST_MATERIAL = structural material
T = tank
TF = tank farm
TPRE = tank prefix
UST = underground storage tank
Y = yes

TABLE 3-25
ABOVEGROUND STORAGE TANKS IN THE SOUTH PLANTS
NORTHERN TIER PRODUCTION AREA
ROCKY MOUNTAIN ARSENAL

BPRE	BLDG	TPRE	TANK	FACILITY	LAST-KNOWN CONTENTS	SHELL	IN-OUT	TYPE	CAPACITY (GAL)	ST_MATERIAL
	0515A	V	1306	ENDRIN/NUDRIN STORAGE	NUDRIN	Y	OUTSIDE	AST/VESSEL	212	STEEL
	0517	V	1248	ADMINISTRATION/CHANGE HOUSE/LAB	AIR	Y	OUTSIDE	AST/VESSEL	238	STEEL
	0518A	T	0001	FIRE PUMPHOUSE	CONTAINS GASOLINE	Y	OUTSIDE	AST	124	STEEL
	0571	C	1082	VENT GAS BURNER	AZODRIN, DDVP, NUDRIN, ACETONE, METHANOL, CHLOROFORM, CARBON TETRACHLORIDE, METHYL CHLORIDE, TRIMETHYL PHOSPHITE, HEXANE	Y	OUTSIDE	AST	2,790	STEEL
	0571B	S	1104	TANK ROOM	UNKNOWN	Y	OUTSIDE	AST/SEPARATOR	72	STEEL
	0571B	V	1188	TANK ROOM	UNKNOWN	Y	OUTSIDE	AST/VESSEL	360	STEEL
	0571B	V	1213	TANK ROOM	UNKNOWN	Y	OUTSIDE	AST/VESSEL	158.6	CARBON STEEL
	0571B	V	1303	TANK ROOM	UNKNOWN	Y	OUTSIDE	AST/VESSEL	286	CARBON STEEL
	0571B	V	1312	TANK ROOM	UNKNOWN	Y	OUTSIDE	AST/VESSEL	53	STEEL
	0724	V	1269	INCINERATOR/PRECIPITATOR/DET	UNKNOWN	Y	OUTSIDE	AST/VESSEL	15,900	STEEL
	0728	T	0001	HD FILLING/PEST. STORAGE/WAREHOUSE	WATER AND UNKNOWN ORGANICS	N	INSIDE	AST	1,357	PLASTIC
	0728	T	0002	HD FILLING/PEST. STORAGE/WAREHOUSE	WATER AND UNKNOWN ORGANICS	N	INSIDE	AST	1,357	PLASTIC
	0728	T	0003	HD FILLING/PEST. STORAGE/WAREHOUSE	WATER AND UNKNOWN ORGANICS	N	INSIDE	AST	1,357	PLASTIC
	0728	T	0004	HD FILLING/PEST. STORAGE/WAREHOUSE	WATER AND UNKNOWN ORGANICS	N	INSIDE	AST	1,357	PLASTIC
NN	0104	V	1183	FLARE TOWER	UNKNOWN	N	OUTSIDE	AST/VESSEL	110	STAINLESS STEEL
TF	0105	T	0004	DET SYSTEM TANKS, SHELL	UNKNOWN	Y	OUTSIDE	AST/BARREL	~55	STEEL
TF	0105	T	1569	DET SYSTEM TANKS, SHELL	UNKNOWN	Y	OUTSIDE	AST/VESSEL	1,085	STAINLESS STEEL
TF	0105A	T	0005	DET SYSTEM TANKS, ARMY	UNKNOWN	N	OUTSIDE	AST	750	FIBERGLASS
TF	0105A	V	1271	DET SYSTEM TANKS, ARMY	UNKNOWN	N	OUTSIDE	AST/VESSEL	160	STEEL
TF	0105A	V	1313	DET SYSTEM TANKS, ARMY	SULFURIC ACID	N	OUTSIDE	AST/VESSEL	5,400	STEEL
T	1606	T	1606	DIESEL FUEL	DIESEL FUEL	N	OUTSIDE	AST	940	STEEL
TF	0106	C	1078	TANK FARM 0106	UNKNOWN	N	OUTSIDE	AST/COLUMN	INA	STEEL
TF	0107	T	0190	TANK FARM 0107	DOWTHERM A	N	OUTSIDE	AST	700	STEEL

Notes:

AST = aboveground storage tank
BLDG = building
BPRE = building prefix
C = column
DDVP = dichlorvos
GAL = gallons
HD = distilled mustard
INA = information not available
MFG = manufacturing
N = no
PEST. = pesticide
ST_MATERIAL = structural material
T = tank
TF = tank farm
TPRE = tank prefix
V = vessel
Y = yes

TABLE 3-26
SALVAGEABLE EQUIPMENT IN THE SOUTH PLANTS
NORTHERN TIER PRODUCTION AREA
ROCKY MOUNTAIN ARSENAL

BLDG	ITEM	QUANTITY	LOCATION	SHELL ARMY	WEIGHT OF MATERIAL (LB)									Total Scrap Value ($)
					UNSAL	CU	STLES	CST	CAST	AL	HAST	TITAN	NICK	
0539	1500 GAL TANK	2		ARMY	0	0	0	4000	0	0	0	0	0	44.00
0539	CAUSTIC SODA VAT	1		ARMY	0	0	0	2000	0	0	0	0	0	22.00
0539	HEATERS	4		ARMY	0	0	0	200	0	0	0	0	0	2.20
0539	MOTORS	2		ARMY	0	0	0	100	0	0	0	0	0	1.10
0539	PUMPS	2		ARMY	0	0	0	100	0	0	0	0	0	1.10
NN0112	FAN	1		ARMY	0	0	0	200	0	0	0	0	0	2.20
NN0112	MOTOR	1		ARMY	0	0	0	100	0	0	0	0	0	1.10

Notes:

AL = aluminum weight
CAST = cast iron
CST = carbon steel
CU = copper
GAL = gallons
HAST = hastelloy
LB = pounds
NICK = nickel
STLES = stainless
N. = Northern
TITAN = titanium
UNSAL = unsalvageable

TABLE 3-27
SHELL BUILDINGS INVENTORIED IN THE SOUTH PLANTS AREA
ROCKY MOUNTAIN ARSENAL

BUILDING	FACILITY	CONTAMINANTS	ASSOCIATED AST	ASSOCIATED UST	VOLUME OF EQUIPMENT EXISTING (yd^3)	VOLUME OF PIPING EXISTING (yd^3)	PCB TRANSFORMERS	MERCURY	ACM
0254	Caustic Fusion Plant/Drum Storage	HISTORICAL Monomethylchloroacetoacetamide, sodium hydroxide, dibrom, aldrin, dieldrin, endrin, azodrin, bidrin, ciodrin SAMPLING: Dust: dieldrin, cadmium, chromium, copper, lead, zinc, arsenic	0	0	12	0	N	NS	Y
0255	Fuel Oil Pump Station & Two Tank Pad	HISTORICAL: Fuel oil	0	0	0	1		NS	Y
0347	Warehouse/Chemical Storage	HISTORICAL: Aldrin, azodrin, bidrin, DBCP, dieldrin, endrin, fluoranthene, methyl naphthalenes, methyl parathion, nudrin, oil, organophosphates, phenanthrene, pyrene SAMPLING: Dust: aldrin, atrazine, cadmium, chlorophenylmethyl sulfone, chlorophenylmethyl sulfoxide, chromium, copper, dieldrin, lead, zinc	0	0	14	53	N	NS	Y
0451	Warehouse/Production Filling	HISTORICAL: DBCP, azodrin, napalm, aldrin-EC, bidrin, ciodrin, dibrom, phosdrin, phosdrin E, vapona, acetone, hexylene glycon, methanol, xylene, soda ash SAMPLING: Dust: aldrin, atrazine, dieldrin	5	1	40	0	N	NS	Y
0459	Acetylene Generator Building	HISTORICAL: Acetylene, calcium carbide, herbicides (bladex, planavin) SAMPLING: Dust: atrazine, cadmium, chromium, copper, lead, zinc, arsenic	7	0	9	0	N	NS	N
0459A	Lime Slurry Pumphouse	HISTORICAL: Lime slurry, acetylene	0	1	1	0	N	NS	N
0459B	Lime Slurry Pumphouse	HISTORICAL: Lime slurry, acetylene SAMPLING: Dust: aldrin, dieldrin, cadmium, chromium, copper, lead, zinc, arsenic	1	0	2	2	N	NS	N

TABLE 3-27
SHELL BUILDINGS INVENTORIED IN THE SOUTH PLANTS AREA
ROCKY MOUNTAIN ARSENAL

BUILDING	FACILITY	CONTAMINANTS	ASSOCIATED AST	ASSOCIATED UST	VOLUME OF EQUIPMENT EXISTING (yd^3)	VOLUME OF PIPING EXISTING (yd^3)	PCB TRANSFORMERS	MERCURY	ACM
0461	Tank Farm Pumphouse	HISTORICAL: Fuel oil, ethyl alcohol, DBCP, intermediates for aldrin and endrin production SAMPLING: Dust: dieldrin, cadmium, chromium, copper, lead, zinc	1	1	13	4	N	NS	Y
0471	TC Reactor/Pesticide Production	HISTORICAL: Thionyl chloride, sulfur dichloride, antimony trichloride, oleum, chlorine, monochlorobenzene, sodium hydroxide, chlorinated paraffin, DDT, sulfuric acid, dibrom, supona, vapona, epon adhesives, pydrin, DBCP, gardona, akton, bisphenol A, phenol, acetone, hydrochloric acid, methyl mercaptan, ionol flaker, carbon tetrachloride, phosdrin 4-EC, bromine, trimethyl phosphite, chlorothiophenol, allylchloride, chloral distillation bottoms, sulfuric acid, sodium hydroxide, acid, nalgene, brown liquid SAMPLING: Dust: DDE, DBCP, aldrin, chlorophenylmethyl sulfone, dieldrin, supona, vapona, cadmium, chromium, copper, lead, zinc, arsenic	28	0	270	0	N	NS	Y
0471C	TC Refrigeration	HISTORICAL: Organochlorine compounds	2	0	30	0	N	NS	N
0472	TC Refrigeration	HISTORICAL: Thionyl chloride, monochlorobenzene, ammonia SAMPLING: Dust: aldrin, dieldrin	4	1	9	0	N	N	N
0472A	Lunchroom/Maintenance Equipment Storage	HISTORICAL: None SAMPLING: Dust: aldrin	0	0	3	1	N	NS	N
0473	TC Drum Loading/Pesticide Packaging	HISTORICAL: Thionyl chloride, DBCP, chlordane, vapona, supona, dibrom, industrial chemicals SAMPLING: Dust: aldrin, dieldrin, cadmium, chromium, copper, lead, zinc, arsenic	7	1	2	0	N	NS	Y

TABLE 3-27
SHELL BUILDINGS INVENTORIED IN THE SOUTH PLANTS AREA
ROCKY MOUNTAIN ARSENAL

BUILDING	FACILITY	CONTAMINANTS	ASSOCIATED AST	ASSOCIATED UST	VOLUME OF EQUIPMENT EXISTING (yd^3)	VOLUME OF PIPING EXISTING (yd^3)	PCB TRANSFORMERS	MERCURY	ACM
0475	Railroad Car Warmer Shed	HISTORICAL: Thionyl chlonde, hydrazine, azodrin, dichlor, soda ash SAMPLING: Dust: cadmium, chromium, copper, lead, zinc, arsenic	0	0	6	0	N	NS	N
0502	West Chemical Metering Pump	HISTORICAL: Chemical sewer contaminants that could include: carbon tetrachloride, chlorobenzene, chloroform, methylene chloride, 1,1,2,2-tetrachloroethylene, trichloroethylene, tetrachlororethylene, bicycloheptadiene, DCPD, benzene, chloroacetic acid, dithiane, 1,4 oxathiane, thiodiglycol, benzothiazole, chlorophenylmethyl sulfide, chlorophenylmethyl sulfone, dimethyldisulfide, atrazine, supona, vapona, DBCP, hydrazine, hexachlorobenzene, hexachlorocyclopentadiene, 1,1-dichloroethane, 1,2-dichloroethane, 1,1-dichloroethylene, trans-1,2-dichloroethylene, 1,1,1-trichloroethane, 1,1,2-trichloroethane, trichloropropene, 2-butoxyethanol, 4-hydroxy-4-2-pentanone, methylcyclohexane, 1-methyl-1,3-cyclopentadiene, methylisobutyl ketone, 2,2-oxybisethanol, 2-pentanone, ethylbenzene, toluene, m-xylene, 0- and p-xylene, chlorophenylmethyl sulfoxide, DIMP, DMMP, isopropylmethyl phosphonic acid, methylphosphonic acid, phosphoric acid-tributyl ester, phosphoric acid-triphenyl ester, malathion, parathion, caprolactam, methylhydrazine, n-nitrosodimethylamine, n-nitrosodi-n-tapropylamine, fluoracetic acid, fluoranthene, methylnaphtalene, phenanthrene, pyrene, hexachlorobutadiene, pentachlorobenzene, tetrachlorobenzene, trichlorcbenzene, aldrin, chlordane, DDE, DDT, dieldrin, endrin, isodrin, arsenic, mercury, cadmium, chromium, copper, lead, zinc, mustard, phosgene, lewisite SAMPLING: Dust: aldrin, atrazine, chlorophenylmethyl sulfone, dieldrin	0	2	1	2	N	NS	N
0503	East Chemical Metering Pump	HISTORICAL: Chemical sewer contaminants that could include the same compounds listed for Bldg. 502, herbicides (bladex, planavin) SAMPLING: Dust: aldrin, atrazine, chlorophenylmethyl sulfone, cadmium, chromium, copper, lead, zinc, arsenic	0	2	1	2	N	NS	N

TABLE 3-27
SHELL BUILDINGS INVENTORIED IN THE SOUTH PLANTS AREA
ROCKY MOUNTAIN ARSENAL

BUILDING	FACILITY	CONTAMINANTS	ASSOCIATED AST	ASSOCIATED UST	VOLUME OF EQUIPMENT EXISTING (yd^3)	VOLUME OF PIPING EXISTING (yd^3)	PCB TRANSFORMERS	MERCURY	ACM
0504	DET Emergency Diesel Generator	HISTORICAL Diesel fuel SAMPLING: Dust: cadmium, chromium, copper, lead, zinc, arsenic	0	0	7	0	N	NS	N
0504A	DET Maintenance Shop/Storage	HISTORICAL: Not available	0	0	1	0	N	NS	N
0505	DET Pretreatment Feed Pump House	HISTORICAL: Chemical sewer contaminants that could include the same compounds listed for Bldg. 502, herbicides (bladex, planavin) SAMPLING: Dust: aldrin, atrazine, chlorophenylmethyl sulfone, cadmium, chromium, copper, lead, zinc, arsenic	0	0	2	1	N	NS	N
0506	DET Control House	HISTORICAL: None	0	0	11	0	N	NS	N
0507	DET Separator Pump House	HISTORICAL: Chemical sewer contaminants that could include the same compounds listed for Building 502, herbicides (bladex, planavin) SAMPLING: Dust: aldrin, atrazine, chlorophenylmethyl sulfone, cadmium, chromium, copper, lead, zinc, arsenic	0	0	8	0	N	NS	N
0508	DET Copper Sulfate Treatment	HISTORICAL: Copper sulfate, copper sulfide, monomethylacetoacetamide, hydrogen sulfide, copper-free raffinate SAMPLING: Dust: cadmium, chromium, copper, lead, zinc, arsenic	0	0	17	0	N	NS	N
0509	DET Methyl Chloride Compressor/Liquifier	HISTORICAL: Methyl chloride, chloride, freon-22, unspecified impurities SAMPLING: Dust: cadmium, chromium, copper, lead, zinc, arsenic	2	1	26	1	N	NS	N

TABLE 3-27
SHELL BUILDINGS INVENTORIED IN THE SOUTH PLANTS AREA
ROCKY MOUNTAIN ARSENAL

BUILDING	FACILITY	CONTAMINANTS	ASSOCIATED AST	ASSOCIATED UST	VOLUME OF EQUIPMENT EXISTING (yd^3)	VOLUME OF PIPING EXISTING (yd^3)	PCB TRANSFORMERS	MERCURY	ACM
0510	Methyl Isocyanate Refrigeration	HISTORICAL Methyl isocyanate	0	0	4	1	N	NS	N
0511	Chlorinated Paraffin Storage Manufacturing	HISTORICAL: Chlorinated paraffin, toluene, hexane, acetic acid, acetone, acetonitrile, acetonitrile-UV, alcozyme, ammonium hydroxide, barium oxide, calcium carbonate, calcium chloride dihydrate, chloroform, chloroform-nanograde, cyclohexanone, dibromomethane, methylene chloride, dimethylformaldehyde, emulsifiers, ethyl acetate, ethylene dichloride, ethylene glycol, heptane, hexane, hydrochloric acid, magnesium oxide, methyl alcohol, methyl alcohol-spectar, N-amyl alcohol, nitric acid, nitrobenzene, nonane, normal octane, phosphoric acid, potassium hydroxide, potassium tholcyanate, propanol 2, pyridine, silicic acid, sodium chromate, sodium tholsulfate, sulfuric acid, thionyl chloride, triethylamine, 1,1,2-trichloroethane, uranine, isopropyl alcohol SAMPLING: Dust: aldrin, dieldrin, cadmium, chromium, copper, lead, zinc, arsenic	15	8	80	63	N	NS	Y
0519	Hydrogen Peroxide Storage	HISTORICAL: Hydrogen peroxide, acetylene SAMPLING: Dust: aldrin, dieldrin, chlorophenylmethyl sulfone, chlorophenylmethyl sulfoxide, cadmium, chromium, copper, lead, zinc, arsenic	0	0	0	1	N	NS	N
0521	Acetylene Compressor/Pesticide Manufacturing	HISTORICAL: Sulfuric acid, sodium hydroxide, acetylene, white phosphorus, fuel oil, hydrochloric acid, chlordane, DCPD, cyclopentadiene, octachlor, hexachlorocyclopentadiene SAMPLING: Dust: dieldrin, hexachlorocyclopentadiene	3	2	1	0	N	NS	Y
0521A	Refrigeration/DCPD Cracking	HISTORICAL: Ammonia, cyclopentadiene, DCPD, hexachlorocyclopentadiene SAMPLING: Dust: dieldrin	4	0	20	0	N	NS	N

TABLE 3-27
SHELL BUILDINGS INVENTORIED IN THE SOUTH PLANTS AREA
ROCKY MOUNTAIN ARSENAL

BUILDING	FACILITY	CONTAMINANTS	ASSOCIATED AST	ASSOCIATED UST	VOLUME OF EQUIPMENT EXISTING (yd^3)	VOLUME OF PIPING EXISTING (yd^3)	PCB TRANSFORMERS	MERCURY	ACM
0521B	Compressor House/Maintainence	HISTORICAL Hexachlorocyclopentadiene SAMPLING: Dust: dieldrin, endrin	0	0	2	0	N	NS	N
0525	Product Development Lab/Nudrin Manufacturing	HISTORICAL: Acetylene, sulfuric acid, sodium hydroxide, phosdrin, bidrin, clodrin, supona, hexacetylene, gardona, akton, landrin, rabon and revap emulsible concentrates, nudrin, hexachlorocyclopentadiene, cyclopentadiene, methylisobutyl ketone, mercaptan, bleach, herbicides (bladex, planavin) SAMPLING: Dust: atrazine, cadmium, chromium, copper, lead, zinc	21	0	110	10	N	NS	Y
0532	Pesticide Storage/Warehouse	HISTORICAL: Planavin, bladex, atrazine, phosdrin, dieldrin, sulfur monochloride, emulphogene, maraperse, formalin, ethylene glycol, kelzan, SMA-10440H, atrazine 4L SAMPLING: Dust: aldrin, atrazine, dieldrin, endrin, cadmium, chromium, copper, lead, zinc, arsenic	0	0	52	36	N	NS	Y
0534	Pump House/Storage	HISTORICAL: Heptane, mercury, paraffin, mixed acid, hexane, acetone, benzene, hydrochloric acid, chlorinated paraffin, hexachlorocyclopentadiene, planavin, copper, herbicides SAMPLING: Dust: DDE atrazine, chlorophenylmethyl sulfone, dieldrin, cadmium, chromium, copper, lead, zinc, arsenic	0	0	1	0	N	NS	Y
0534A	Drum Storage/Field Shop/Office	HISTORICAL: Paraffin, herbicides SAMPLING: Dust: aldrin, atrazine, chlorophenylmethyl sulfone, dieldrin, cadmium, chromium, copper, lead, zinc, arsenic, parathion	0	0	2	0	N	NS	N

TABLE 3-27
SHELL BUILDINGS INVENTORIED IN THE SOUTH PLANTS AREA
ROCKY MOUNTAIN ARSENAL

BUILDING	FACILITY	CONTAMINANTS	ASSOCIATED AST	ASSOCIATED UST	VOLUME OF EQUIPMENT EXISTING (yd^3)	VOLUME OF PIPING EXISTING (yd^3)	PCB TRANSFORMERS	MERCURY	ACM
0534B	Planavin Manufacture	HISTORICAL Planavin, dinitro, mixed acid, sulfuric acid, sulfone vent vapors, bromine vapors, sewer fumes, nitrogen vapors, soda ash, sulfone, herbicides (bladex), supona SAMPLING: Dust: atrazine, chlorophenylmethyl sulfone, cadmium, chromium, copper, lead, zinc, arsenic	2	1	58	9	N	NS	N
0557	Salvage Yard Storage/Maintenance	HISTORICAL: Not Available SAMPLING: Dust: aldrin, chlorphenylmethyl sulfone, dieldrin	0	0	3	0	N	NS	N
0571	Vent Gas Burner	HISTORICAL: Methylisobutyl ketone, azodrin, nudrin, vapona, methylbutyl ketone, acetaldehyde, natural gas, acetone, methanol, hexane, chloroform, carbon tetrachloride, methyl chloride, trimethyl phosphite SAMPLING: Dust: dieldrin	2	0	50	57	N	NS	N
0571B	Tank Room/HCCPD Drum Storage	HISTORICAL: Azodrin, hexachlorocyclopentadiene, heavy and light organic liquids, sulfuryl chloride, methylisobutyl ketone, bleach, azodrin, vapona, acetone, chloroform, nudrin, DET knockout pots SAMPLING: Dust: aldrin, cadmium, chromium, copper, lead, zinc, arsenic	11	1	21	0	N	NS	N
0724	Incinerator/Electrostatic Precipitator	HISTORICAL: DET wastes could include the same compounds listed for Bldg. 502, PCBs SAMPLING: Dust: chlorophenylmethyl sulfone, dieldrin, cadmium, chromium, copper, lead, zinc, arsenic	2	0	88	0	N	NS	N
0746	Gasoline Unloading Rack	HISTORICAL: Gasoline, diesel fuel, DCPD	0	0	0	1	N	NS	Y
NN0106	Fertilizer & Waste Loading Facility-North of 728	Not Available	0	0	0	1	N	N	Y

TABLE 3-27
SHELL BUILDINGS INVENTORIED IN THE SOUTH PLANTS AREA
ROCKY MOUNTAIN ARSENAL

BUILDING	FACILITY	CONTAMINANTS	ASSOCIATED AST	ASSOCIATED UST	VOLUME OF EQUIPMENT EXISTING (yd^3)	VOLUME OF PIPING EXISTING (yd^3)	PCB TRANSFORMERS	MERCURY	ACM
NN0111	Three Metal Incinerator-Northwest of 541	Not Available	0	0	4	0	N	N	N

Notes:

ACM = asbestos-containing material
AST = aboveground storage tank
DBCP = dibromochloropropane
DCPD = dicyclopentadiene
DDE = 1,1-dichloro-2,2-bis (p-chlorophenyl) eth
DDT = dichlorodiphenyltrichloroethane
DET = Denver Effluent Treatment
DMMP = dimethylmethyl phosphonate
HCCPD = hexachlorocyclopentadiene
N = no
NS = not sampled
PCB = polychlorinated biphenyl
TC = thionyl chloride
UST = underground storage tank
UV = ultraviolet
Y = yes
yd^3 = cubic yards

TABLE 3-28
SHELL EQUIPMENT IN THE SOUTH PLANTS AREA
ROCKY MOUNTAIN ARSENAL

BLDG	ITEM	QUANTITY	LOCATION	AREA	WEIGHT OF MATERIAL (LB)									Total Scrap Value ($)
					UNSAL	CU	STLES	CST	CAST	AL	HAST	TITAN	NICK	
0254	HOIST	1		CBU	0	0	0	1000	0	0	0	0	0	11.00
0255	MOTORS	2		CBU	0	0	0	600	0	0	0	0	0	6.60
0255	PUMPS	2		CBU	0	0	0	300	0	0	0	0	0	3.30
0255	VALVES, 4" AND 2"	17		CBU	0	0	0	1700	0	0	0	0	0	18.70
0459	ACETYLENE GENERATOR	1		SOUTH TIER	0	0	0	6000	0	0	0	0	0	66.00
0459	MOTORS	2		SOUTH TIER	0	0	0	600	0	0	0	0	0	6.60
0459	PUMPS	2		SOUTH TIER	0	0	0	300	0	0	0	0	0	3.30
0459	VESSELS	2		SOUTH TIER	0	0	0	1000	0	0	0	0	0	11.00
0459B	MOTORS	2	INSIDE & OUT	SOUTH TIER	0	0	0	600	0	0	0	0	0	6.60
0459B	PUMP	1		SOUTH TIER	0	0	0	150	0	0	0	0	0	1.65
0461	FUEL OIL FILTERS	2		SOUTH TIER	0	0	0	150	0	0	0	0	0	1.65
0461	MOTORS	2		SOUTH TIER	0	0	0	600	0	0	0	0	0	6.60
0461	PUMPS	4	2 IN, 2 OUTSIDE	SOUTH TIER	0	0	0	300	300	0	0	0	0	6.60
0461	TANK	1	OUTSIDE	SOUTH TIER	0	0	0	400	0	0	0	0	0	4.40
0471	AIR WASH	1		SOUTH TIER	0	0	0	300	0	0	0	0	0	3.30
0471	BLOWER	1		SOUTH TIER	0	0	0	200	0	0	0	0	0	2.20
0471	CARTRIDGE, STAINLESS	2		SOUTH TIER	0	0	500	0	0	0	0	0	0	75.00
0471	EXCHANGER, UNKNOWN MATERIAL	1		SOUTH TIER	0	0	0	500	0	0	0	0	0	5.50
0471	HOOD	6		SOUTH TIER	0	0	0	1800	0	0	0	0	0	19.80
0471	JET SYSTEM	1		SOUTH TIER	0	0	0	500	0	0	0	0	0	5.50
0471	MOTORS	6		SOUTH TIER	0	0	0	600	0	0	0	0	0	6.60
0471	VESSEL, 55 GAL, STLES & CST	1		SOUTH TIER	0	0	0	100	0	0	0	0	0	1.10
0471	REACTOR, GLASS LINED, 500 GAL	1		SOUTH TIER	0	0	0	3500	0	0	0	0	0	38.50
0471	VESSEL, HASTELLOY B	3		SOUTH TIER	0	0	0	0	0	0	100	0	0	150.00
0471	SEPARATOR, STAINLESS	2		SOUTH TIER	0	0	1000	0	0	0	0	0	0	150.00
0471	TANK, ENAMEL LINED,	2		SOUTH TIER	0	0	0	5000	0	0	0	0	0	55.00
0471	PUMP, UNKNOWN MATERIAL	2		SOUTH TIER	0	0	0	300	0	0	0	0	0	3.30
0471	REACTOR, ENAMEL LINED, 500 GAL	2		SOUTH TIER	0	0	0	6000	0	0	0	0	0	66.00
0471	REACTOR, NUCERITE LINED, 500 GAL	2		SOUTH TIER	0	0	0	6000	0	0	0	0	0	66.00

TABLE 3-28
SHELL EQUIPMENT IN THE SOUTH PLANTS AREA
ROCKY MOUNTAIN ARSENAL

BLDG	ITEM	QUANTITY	LOCATION	AREA	WEIGHT OF MATERIAL (LB)									Total Scrap Value ($)
					UNSAL	CU	STLES	CST	CAST	AL	HAST	TITAN	NICK	
0471	EXCHANGER, SS	1		SOUTH TIER	0	200	0	0	0	0	0	0	30.00	
0471	EXCHANGER, STEEL	1		SOUTH TIER	0	0	200	0	0	0	0	0	2.20	
0471	EXCHANGER, TITANIUM	1		SOUTH TIER	0	0	0	0	0	0	150	0	270.00	
0471	EXCHANGER, NICKEL	1		SOUTH TIER	0	0	0	0	0	0	0	150	135.00	
0471	PUMP, IRON	1		SOUTH TIER	0	0	0	150	0	0	0	0	1.65	
0471	PUMP, IRON	2		SOUTH TIER	0	0	0	300	0	0	0	0	3.30	
0471	PUMP	1		SOUTH TIER	0	150	0	0	0	0	0	0	22.50	
0471	TANK, GLASS LINED STEEL, 30 G	1		SOUTH TIER	0	0	100	0	0	0	0	0	1.10	
0471	TANK, 150 GAL	1		SOUTH TIER	0	300	0	0	0	0	0	0	45.00	
0471	PUMP, WORTHITE	1		SOUTH TIER	0	0	100	0	0	0	0	0	1.10	
0471	TANK, 2000 & 566 GA	2		SOUTH TIER	0	0	8000	0	0	0	0	0	88.00	
0471	TANK, AL, 110 GAL	1		SOUTH TIER	0	0	0	0	200	0	0	0	60.00	
0471C	AIR DRYER	1		SOUTH TIER	0	0	0	500	0	0	0	0	0	5.50
0471C	MOTORS	4		SOUTH TIER	0	0	0	400	0	0	0	0	0	4.40
0471C	VESSEL, 275 GAL	1		SOUTH TIER	0	0	0	500	0	0	0	0	0	5.50
0472	AIR DRYER	2		SOUTH TIER	0	0	0	500	0	0	0	0	0	5.50
0472	EVAPORATOR	1		SOUTH TIER	0	0	0	500	0	0	0	0	0	5.50
0472	EXCHANGERS	5		SOUTH TIER	0	0	0	2500	0	0	0	0	0	27.50
0472	HEATERS	2		SOUTH TIER	0	0	0	400	0	0	0	0	0	4.40
0472	MOTORS	3		SOUTH TIER	0	0	0	300	0	0	0	0	0	3.30
0472	PUMPS	4		SOUTH TIER	0	0	0	600	0	0	0	0	0	6.60
0472	VESSEL	1		SOUTH TIER	0	0	0	400	0	0	0	0	0	4.40
0473	DRUM LOADING HOOD	1		SOUTH TIER	0	0	0	500	0	0	0	0	0	5.50
0473	EXCHANGER	2		SOUTH TIER	0	0	0	2000	0	0	0	0	0	22.00
0473	TOLEDO SCALES	2		SOUTH TIER	0	0	0	1000	0	0	0	0	0	11.00
0475	RADIATOR	6		SOUTH TIER	0	0	0	600	0	0	0	0	0	6.60
0502	FILTER CARTRIDGE	6		NORTH TIER	0	0	0	600	0	0	0	0	0	6.60
0502	TRANE HEATER	1		NORTH TIER	0	0	0	200	0	0	0	0	0	2.20
0504	HEATER	1		NORTH TIER	0	0	0	200	0	0	0	0	0	2.20

TABLE 3-28
SHELL EQUIPMENT IN THE SOUTH PLANTS AREA
ROCKY MOUNTAIN ARSENAL

BLDG	ITEM	QUANTITY	LOCATION	AREA	WEIGHT OF MATERIAL (LB)									Total Scrap Value ($)
					UNSAL	CU	STLES	CST	CAST	AL	HAST	TITAN	NICK	
0504A	WATER HEATER	1		NORTH TIER	0	0	0	200	0	0	0	0	0	2.20
0505	FILTER SEPARATOR	1		NORTH TIER	0	0	0	500	0	0	0	0	0	5.50
0505	pH TRIM METER	1		NORTH TIER	0	0	0	50	0	0	0	0	0	0.55
0505	PUMP	1		NORTH TIER	0	0	0	150	0	0	0	0	0	1.65
0506	HOOD	1		NORTH TIER	0	0	0	100	0	0	0	0	0	1.10
0507	HEATER	1		NORTH TIER	0	0	0	200	0	0	0	0	0	2.20
0508	HOIST	1		NORTH TIER	0	0	0	1000	0	0	0	0	0	11.00
0508	MACHINERY	1		NORTH TIER	0	0	0	300	0	0	0	0	0	3.30
0508	MOTORS	5		NORTH TIER	0	0	0	1500	0	0	0	0	0	16.50
0508	PUMPS	4		NORTH TIER	0	0	0	600	0	0	0	0	0	6.60
0508	SCRUBBER	2		NORTH TIER	0	0	0	1000	0	0	0	0	0	11.00
0508	TANK	1		NORTH TIER	0	0	0	500	0	0	0	0	0	5.50
0511	HOODS	3		NORTH TIER	0	0	0	600	0	0	0	0	0	6.60
0511	REACTORS	4		NORTH TIER	0	0	0	16000	0	0	0	0	0	176.00
0521A	COMPRESSOR	2		NORTH TIER	0	0	0	800	0	0	0	0	0	8.80
0521A	MOTORS	2		NORTH TIER	0	0	0	600	0	0	0	0	0	6.60
0521A	TANKS	2		NORTH TIER	0	0	0	800	0	0	0	0	0	8.80
0525	AIR CONDITIONER	1		NORTH TIER	0	0	0	300	0	0	0	0	0	3.30
0525	ANTIFOAM INJECTION SYSTEM	1		NORTH TIER	0	0	0	300	0	0	0	0	0	3.30
0525	CONDENSOR, GLASS	2		NORTH TIER	0	0	0	4000	0	0	0	0	0	44.00
0525	CONTAINER	1		NORTH TIER	0	0	0	200	0	0	0	0	0	2.20
0525	DRYING COLUMN	1		NORTH TIER	0	0	0	150	0	0	0	0	0	1.65
0525	HOIST	1		NORTH TIER	0	0	0	1000	0	0	0	0	0	11.00
0525	FILTER	2		NORTH TIER	0	0	0	200	0	0	0	0	0	2.20
0525	HEAT EXCHANGER	4		NORTH TIER	0	0	0	1200	0	0	0	0	0	13.20
0525	HEATER	1		NORTH TIER	0	0	0	200	0	0	0	0	0	2.20
0525	FEEDER	1		NORTH TIER	0	0	0	300	0	0	0	0	0	3.30
0525	HOODS	3		NORTH TIER	0	0	0	500	0	0	0	0	0	5.50
0525	INDUSTRIAL BLOWER	1		NORTH TIER	0	0	0	300	0	0	0	0	0	3.30

TABLE 3-28
SHELL EQUIPMENT IN THE SOUTH PLANTS AREA
ROCKY MOUNTAIN ARSENAL

BLDG	ITEM	QUANTITY	LOCATION	AREA	WEIGHT OF MATERIAL (LB)									Total Scrap Value ($)
					UNSAL	CU	STLES	CST	CAST	AL	HAST	TITAN	NICK	
0525	MOTOR	7		NORTH TIER	0	0	0	2100	0	0	0	0	0	23.10
0525	PUMPS	4		NORTH TIER	0	0	0	600	0	0	0	0	0	6.60
0525	REACTOR, 750 GAL	1		NORTH TIER	0	0	0	5900	0	0	0	0	0	64.90
0525	REACTOR, GLASS 3000 GAL	2	1ST & 2ND FLOOR	NORTH TIER	0	0	0	20000	0	0	0	0	0	220.00
0525	SCRUBBER COLUMN	1		NORTH TIER	0	0	0	150	0	0	0	0	0	1.65
0525	STACK	1		NORTH TIER	0	0	0	200	0	0	0	0	0	2.20
0525	TANK	3		NORTH TIER	0	0	0	800	0	0	0	0	0	8.80
0525	TANK, GLASS	2		NORTH TIER	0	0	0	4000	0	0	0	0	0	44.00
0525	TOLEDO SCALE	1		NORTH TIER	0	0	0	1000	0	0	0	0	0	11.00
0525	UTILITY FAN	1		NORTH TIER	0	0	0	300	0	0	0	0	0	3.30
0525	VALVE	2		NORTH TIER	0	0	0	400	0	0	0	0	0	4.40
0525	VESSEL	4		NORTH TIER	0	0	0	2000	0	0	0	0	0	22.00
0525	WASH BASIN	1		NORTH TIER	0	0	0	200	0	0	0	0	0	2.20
0532	HVAC UNIT	3		NORTH TIER	0	0	0	500	0	0	0	0	0	5.50
0532	VESSEL	2		NORTH TIER	0	0	0	1000	0	0	0	0	0	11.00
0534A	DISTILLATION UNITS	2		NORTH TIER	0	0	0	500	0	0	0	0	0	5.50
0534B	BLOWER	1	2ND FLOOR	NORTH TIER	0	0	0	200	0	0	0	0	0	2.20
0534B	EXCHANGER	1	1ST FLOOR	NORTH TIER	0	0	0	150	0	0	0	0	0	1.65
0534B	MOTOR	3	2ND FLOOR	NORTH TIER	0	0	0	300	0	0	0	0	0	3.30
0534B	VESSEL	2	2ND FLOOR	NORTH TIER	0	0	0	600	0	0	0	0	0	6.60
0557	SCALES	2		SOUTH TIER	0	0	0	1000	0	0	0	0	0	11.00
0557	SCRAP PILE, AL	1		SOUTH TIER	0	0	0	0	0	1000	0	0	0	300.00
0571	MIXING TANK	1		NORTH TIER	0	0	0	400	0	0	0	0	0	4.40
0571B	MIXING TANKS	3		NORTH TIER	0	0	0	600	0	0	0	0	0	6.60
0571B	PUMPS, HASTELLOY C	2		NORTH TIER	0	0	0	0	0	0	100	0	0	150.00
0571B	PUMPS, STAINLESS STEEL	2		NORTH TIER	0	0	200	0	0	0	0	0	0	30.00
0724	AGGLOMERATOR	1		NORTH TIER	0	0	0	400	0	0	0	0	0	4.40
0724	AUGER FEED	1		NORTH TIER	0	0	0	300	0	0	0	0	0	3.30
0724	ELECTROSTATIC PRECIPITATOR	1		NORTH TIER	0	0	0	12000	0	0	0	0	0	132.00

TABLE 3-28
SHELL EQUIPMENT IN THE SOUTH PLANTS AREA
ROCKY MOUNTAIN ARSENAL

BLDG	ITEM	QUANTITY	LOCATION	AREA	WEIGHT OF MATERIAL (LB)									Total Scrap Value ($)
					UNSAL	CU	STLES	CST	CAST	AL	HAST	TITAN	NICK	
0724	EXCHANGER	1		NORTH TIER	0	0	0	200	0	0	0	0	0	2.20
0724	FEED HOPPER, AGGLOMERATOR	1		NORTH TIER	0	0	0	500	0	0	0	0	0	5.50
0724	INCINERATOR, REFRACTORY LINER	1		NORTH TIER	0	0	0	0	0	0	0	0	0	0.00
0724	PUMP	1		NORTH TIER	0	0	0	150	0	0	0	0	0	1.65
0724	SCREW CONVEYOR	1		NORTH TIER	0	0	0	1000	0	0	0	0	0	11.00
0724	VESSEL 1388 GAL	1		NORTH TIER	0	0	0	3000	0	0	0	0	0	33.00
557	ALUMINUM SCRAP, 1/2 TON	1	WEST SIDE	SOUTH TIER	0	0	0	0	0	1000	0	0	0	300.00
557	ELECTRICAL, SCC Y505	1	EAST SIDE	SOUTH TIER	75	0	0	0	0	0	0	0	0	0.00
557	MISC PVC JOINTS	1	EAST SIDE	SOUTH TIER	100	0	50	0	0	0	0	0	0	7.50
557	TANK SCALES	2	WEST SIDE	SOUTH TIER	0	0	0	1000	0	0	0	0	0	11.00
NN0108	MOTOR	1		NORTH TIER	0	0	0	300	0	0	0	0	0	3.30
NN0108	PUMPS	2		NORTH TIER	0	0	0	300	0	0	0	0	0	3.30
NN0111	INCINERATORS	3		NORTH TIER	0	0	0	18000	0	0	0	0	0	198.00
SSY	1-TON TRUCK BED	1	SCRAP	SOUTH TIER	0	0	0	1000	0	0	0	0	0	11.00
SSY	2 TONS IRON	1	P&E II	SOUTH TIER	0	0	0	0	4000	0	0	0	0	44.00
SSY	2" dia PIPING	0	P&E I	SOUTH TIER	0	0	0	350	0	0	0	0	0	3.85
SSY	ALUMINUM DRUMS	2	METAL CULVERTS	SOUTH TIER	0	0	0	0	0	50	0	0	0	15.00
SSY	ALUMINUM PIPING, 30' SECTIONS	0	ALUMINUM PIPING	SOUTH TIER	0	0	0	0	0	4000	0	0	0	1200.00
SSY	BAG FILTER HOUSINGS	20	P&E I	SOUTH TIER	0	0	800	0	0	0	0	0	0	120.00
SSY	CAST IRON SINK	1	P&E II	SOUTH TIER	0	0	0	0	150	0	0	0	0	1.65
SSY	CIRCUIT BOX, #181808	1	SCRAP V	SOUTH TIER	75	0	0	0	0	0	0	0	0	0.00
SSY	CLAY PIPE	25	WEST FENCE	SOUTH TIER	2000	0	0	0	0	0	0	0	0	0.00
SSY	CONCRETE CULVERTS	0	WEST FENCE	SOUTH TIER	200	0	0	0	0	0	0	0	0	0.00
SSY	CONVEYOR RINSE, SCC A1508	1	VENTS & STACKS	SOUTH TIER	0	0	0	500	0	0	0	0	0	5.50
SSY	GALVANIZED STEEL	1	DUCT WORK	SOUTH TIER	0	0	0	300	0	0	0	0	0	3.30
SSY	GALVANIZED STEEL ROOF	1	SCRAP	SOUTH TIER	0	0	0	200	0	0	0	0	0	2.20
SSY	CONVEYOR, STEEL & ALUMINUM	1	P&E II	SOUTH TIER	0	0	0	50	0	25	0	0	0	8.05
SSY	HALF STORAGE TANKS, 12'X6'	12	STORAGE TANKS	SOUTH TIER	0	0	0	24000	0	0	0	0	0	264.00
SSY	ELECTRIC MOTOR, #51-480-068-20	1	PUMPS	SOUTH TIER	0	0	0	0	200	0	0	0	0	2.20

TABLE 3-28
SHELL EQUIPMENT IN THE SOUTH PLANTS AREA
ROCKY MOUNTAIN ARSENAL

BLDG	ITEM	QUANTITY	LOCATION	AREA	WEIGHT OF MATERIAL (LB)									Total Scrap Value ($)
					UNSAL	CU	STLES	CST	CAST	AL	HAST	TITAN	NICK	
SSY	HASTALLOY SCRAP, 1000 LBS	1	METAL CULVERTS	SOUTH TIER	0	0	0	0	0	0	1000	0	0	1500.00
SSY	FUEL PUMP, A26-A167	1	FUEL PUMPS	SOUTH TIER	0	0	0	75	0	0	0	0	0	0.83
SSY	CONVEYOR, SCC A1119	1	VENTS & STACKS	SOUTH TIER	0	0	0	500	0	0	0	0	0	5.50
SSY	DIESEL TANK, T1606	1	DIESEL TANK	SOUTH TIER	0	0	0	1000	0	0	0	0	0	11.00
SSY	EMPTY DRUMS	18	SCRAP V	SOUTH TIER	0	0	0	540	0	0	0	0	0	5.94
SSY	FUEL PUMP, A26-N2123	1	FUEL PUMPS	SOUTH TIER	0	0	0	75	0	0	0	0	0	0.83
SSY	HOIST, P2-432	1	P&E I	SOUTH TIER	0	0	0	200	0	0	0	0	0	2.20
SSY	HOUSINGS FOR CONVEYORS, SCALE	6	VENTS & STACKS	SOUTH TIER	0	0	0	3000	0	0	0	0	0	33.00
SSY	METAL SCRAP, 2 TON	1	METAL CULVERTS	SOUTH TIER	0	0	0	4000	0	0	0	0	0	44.00
SSY	MISC COUPLINGS	200	P&E I	SOUTH TIER	0	0	0	400	0	0	0	0	0	4.40
SSY	MISC FLANGES	1	P&E II	SOUTH TIER	0	0	0	200	0	0	0	0	0	2.20
SSY	STAIRWAY	1	SCRAP	SOUTH TIER	0	0	0	100	0	0	0	0	0	1.10
SSY	MISC METAL SCRAP	1	VENTS & STACKS	SOUTH TIER	0	0	0	500	0	0	0	0	0	5.50
SSY	STEAM CLEANER, SSC P1786	1	PUMPS	SOUTH TIER	0	0	0	200	0	0	0	0	0	2.20
SSY	MIXING TANK, T1160, 150 GAL	1	P&E I	SOUTH TIER	0	0	0	200	0	0	0	0	0	2.20
SSY	STEEL & POLY PIPE, 20'X4"dia	1	P&E I, RACK 1	SOUTH TIER	0	0	0	216	0	0	0	0	0	2.38
SSY	MOTOR, 50 HP A1	1	P&E I	SOUTH TIER	0	0	0	150	0	0	0	0	0	1.65
SSY	STEEL BOX, 6X6'	1	SCRAP V	SOUTH TIER	0	0	0	100	0	0	0	0	0	1.10
SSY	MOTOR, 50 HP A3	1	P&E I	SOUTH TIER	0	0	0	150	0	0	0	0	0	1.65
SSY	STEEL CULVERTS	2	WEST FENCE	SOUTH TIER	0	0	0	100	0	0	0	0	0	1.10
SSY	MOTOR, 50 HP P4590110	1	P&E I	SOUTH TIER	0	0	0	150	0	0	0	0	0	1.65
SSY	STEEL PIPE, 10'X4"dia	4	WEST FENCE	SOUTH TIER	0	0	0	400	0	0	0	0	0	4.40
SSY	MOTOR, DM228	1	P&E I	SOUTH TIER	0	0	0	150	0	0	0	0	0	1.65
SSY	STEEL PIPE, 10'X8"dia	16	WEST FENCE	SOUTH TIER	0	0	0	3000	0	0	0	0	0	33.00
SSY	MOTOR, SCC 3-102	1	METAL CULVERTS	SOUTH TIER	0	0	0	150	0	0	0	0	0	1.65
SSY	STEEL PIPE, 10'X8"dia	10	WEST FENCE	SOUTH TIER	0	0	0	2700	0	0	0	0	0	29.70
SSY	MOTOR, SCC D1903	1	P&E I	SOUTH TIER	0	0	0	150	0	0	0	0	0	1.65
SSY	STEEL PIPE, 15'X1"dia	1	P&E I, RACK 1	SOUTH TIER	0	0	0	25	0	0	0	0	0	0.28
SSY	OIL GEAR, #105905	1	PUMPS	SOUTH TIER	0	0	0	200	0	0	0	0	0	2.20

TABLE 3-28
SHELL EQUIPMENT IN THE SOUTH PLANTS AREA
ROCKY MOUNTAIN ARSENAL

BLDG	ITEM	QUANTITY	LOCATION	AREA	WEIGHT OF MATERIAL (LB)									Total Scrap Value ($)
					UNSAL	CU	STLES	CST	CAST	AL	HAST	TITAN	NICK	
SSY	STEEL PIPE, 15'X1/2"dia	1	P&E I, RACK 1	SOUTH TIER	0	0	0	13	0	0	0	0	0	0.14
SSY	PICNIC TABLE	1	P&E II	SOUTH TIER	50	0	0	0	0	0	0	0	0	0.00
SSY	STEEL PIPE, 15'X2"dia	1	P&E I, RACK 1	SOUTH TIER	0	0	0	55	0	0	0	0	0	0.61
SSY	PVC PIPE, 8"dia	1	WEST FENCE	SOUTH TIER	60	0	0	0	0	0	0	0	0	0.00
SSY	STEEL PIPE, 15'X4"dia	17	P&E II	SOUTH TIER	0	0	0	2700	0	0	0	0	0	29.70
SSY	REFRIGERATORS	6	SCRAP V	SOUTH TIER	600	0	0	0	0	0	0	0	0	0.00
SSY	STEEL PIPE, 20'X1/2"dia	4	P&E I, RACK 1	SOUTH TIER	0	0	0	17	0	0	0	0	0	0.19
SSY	SCALE, ACC A1112	1	VENTS & STACKS	SOUTH TIER	0	0	0	500	0	0	0	0	0	5.50
SSY	STEEL PIPE, 20'X2"dia	3	P&E I, RACK 1	SOUTH TIER	0	0	0	73	0	0	0	0	0	0.80
SSY	SCRAP METAL	1	P&E II	SOUTH TIER	0	0	0	1000	0	0	0	0	0	11.00
SSY	STEEL PIPE, 20'X3/4"dia	2	P&E I, RACK 1	SOUTH TIER	0	0	0	25	0	0	0	0	0	0.28
SSY	SCREEN FILTERS	12	P&E I	SOUTH TIER	0	0	360	0	0	0	0	0	0	54.00
SSY	STEEL SCRAP IN ROLL OFF	1	TANK SCRAP	SOUTH TIER	0	0	3000	4000	0	0	0	0	0	494.00
SSY	MISC VENTS	1	VENTS & STACKS	SOUTH TIER	0	0	0	500	0	0	0	0	0	5.50
SSY	TANK RACKS	2	WEST FENCE	SOUTH TIER	0	0	0	200	0	0	0	0	0	2.20
SSY	MOTOR, 50 HP A2	1	P&E I	SOUTH TIER	0	0	0	150	0	0	0	0	0	1.65
SSY	TANK RACKS	8	EAST FENCE	SOUTH TIER	0	0	0	800	0	0	0	0	0	8.80
SSY	MOTOR, DM1501	1	P&E I	SOUTH TIER	0	0	0	150	0	0	0	0	0	1.65
SSY	TANK, 100 GAL T1196	1	VENTS & STACKS	SOUTH TIER	0	0	0	200	0	0	0	0	0	2.20
SSY	MOTOR, SCC D1602	1	P&E I	SOUTH TIER	0	0	0	150	0	0	0	0	0	1.65
SSY	TANK, 100 GAL T1245	1	VENTS & STACKS	SOUTH TIER	0	0	0	200	0	0	0	0	0	2.20
SSY	PALLET OF LIGHTS	1	P&E II	SOUTH TIER	50	0	0	0	0	0	0	0	0	0.00
SSY	TANK, 500 GAL	1	FUEL TANKS	SOUTH TIER	0	0	0	1000	0	0	0	0	0	11.00
SSY	REACTOR, R64, 500 GAL	1	P&E I	SOUTH TIER	0	0	0	600	0	0	0	0	0	6.60
SSY	TANK, 7000 GAL	1	FUEL TANKS	SOUTH TIER	0	0	0	7000	0	0	0	0	0	77.00
SSY	SCALE, SCC A1052	1	VENTS & STACKS	SOUTH TIER	0	0	0	500	0	0	0	0	0	5.50
SSY	TANK, T1764, 2000 GAL	1	FUEL TANKS	SOUTH TIER	0	0	0	3000	0	0	0	0	0	33.00
SSY	STAIRS	1	SCRAP V	SOUTH TIER	0	0	0	100	0	0	0	0	0	1.10
SSY	TANK, T258, 5000 GAL	1	FUEL TANKS	SOUTH TIER	0	0	0	5000	0	0	0	0	0	55.00

TABLE 3-28
SHELL EQUIPMENT IN THE SOUTH PLANTS AREA
ROCKY MOUNTAIN ARSENAL

BLDG	ITEM	QUANTITY	LOCATION	AREA	WEIGHT OF MATERIAL (LB)									Total Scrap Value ($)
					UNSAL	CU	STLES	CST	CAST	AL	HAST	TITAN	NICK	
SSY	MOTOR, 50 HP P4390109	1	P&E I	SOUTH TIER	0	0	0	150	0	0	0	0	0	1.65
SSY	TITANIUM SCRAP, 1 TON	1	METAL CULVERTS	SOUTH TIER	0	0	0	0	0	0	0	2000	0	3600.00
SSY	MOTOR, SCC P1270	1	P&E I	SOUTH TIER	0	0	0	150	0	0	0	0	0	1.65
SSY	TUBES AND FLANGES	1	P&E I	SOUTH TIER	0	0	0	200	0	0	0	0	0	2.20
SSY	S1205	1	P&E I	SOUTH TIER	0	0	0	0	0	0	0	0	0	0.00
SSY	MOTOR, 50 HP 3Y221530A4	1	P&E I	SOUTH TIER	0	0	0	150	0	0	0	0	0	1.65
SSY	MOTOR, DMC2	1	P&E I	SOUTH TIER	0	0	0	150	0	0	0	0	0	1.65
SSY	POLY DRUM	1	METAL CULVERTS	SOUTH TIER	20	0	0	0	0	0	0	0	0	0.00
SSY	SCRAP TIN, 1TON	1	SCRAP V	SOUTH TIER	0	0	0	0	0	0	0	0	0	0.00
SSY	WASHER	1	SCRAP V	SOUTH TIER	100	0	0	0	0	0	0	0	0	0.00
SSY	WELDER, SCC UW9016	1	P&E I	SOUTH TIER	0	0	0	200	0	0	0	0	0	2.20
SSY	WELDER, SCC UW9032	1	P&E I	SOUTH TIER	0	0	0	200	0	0	0	0	0	2.20
SSY	WELDER, SCC UW9034	1	P&E I	SOUTH TIER	0	0	0	200	0	0	0	0	0	2.20
SSY	WOOD SCRAP	1	WEST FENCE	SOUTH TIER	100	0	0	0	0	0	0	0	0	0.00

NOTES:
AL = aluminum
BLDG = building
CAST = cast iron
CST = carbon steel
CU = copper
DET = Denver Effluent Treatment
dia = diameter
GAL = gallon
HAST = hasteloy
HP = horsepower
LB = pound
MISC = miscellaneous
N. = northern
NICK = nickel
P&E = piping and equipment
PVC = polyvinyl chloride
S. = southern
STLES = stainless steel
TITAN = titanium
UNSAL = unsalvageable

TABLE 3-29
ABOVEGROUND STORAGE TANKS INSIDE SHELL BUILDINGS IN THE SOUTH PLANTS AREA
ROCKY MOUNTAIN ARSENAL

BLDG	TPRE	TANK	FACILITY	LAST KNOWN CONTENTS	AREA	IN_OUT	TYPE	CAPACITY (GAL)	ST_MAT
0451	T	0001	WAREHOUSE/PRODUCTION FILLING	AIR	SOUTH TIER	INSIDE	AST	80	STEEL
0451	V	1054	WAREHOUSE/PRODUCTION FILLING	UNKNOWN	SOUTH TIER	INSIDE	AST/VESSEL	110	STEEL
0459	S	1034	ACETYLENE GENERATOR BLDG	UNKNOWN	SOUTH TIER	INSIDE	AST	35	STEEL
0459	T	0001	ACETYLENE GENERATOR BLDG	LIME SLURRY	SOUTH TIER	INSIDE	AST	118	STEEL
0459	T	0002	ACETYLENE GENERATOR BLDG	UNKNOWN	SOUTH TIER	INSIDE	AST/VESSEL	1,028	STEEL
0459	T	1015	ACETYLENE GENERATOR BLDG	ISOPROPYL ALCOHOL	SOUTH TIER	INSIDE	AST/VESSEL	53	STEEL
0459	T	1016	ACETYLENE GENERATOR BLDG	PROBABLY ISOPROPYL ALCOHOL	SOUTH TIER	INSIDE	AST/VESSEL	53	STEEL
0459B	T	0172	LIME SLURRY PUMP HOUSE	LIME SLURRY	SOUTH TIER	INSIDE	AST	7,500	STEEL
0471	A	1110	TC REACTOR/PESTICIDE PROD	UNKNOWN	SOUTH TIER	INSIDE	AST	258	FIBERGLASS
0471	R	0028	TC REACTOR/PESTICIDE PROD	UNKNOWN	SOUTH TIER	INSIDE	AST/REACTOR	500	STEEL
0471	R	0030	TC REACTOR/PESTICIDE PROD	UNKNOWN	SOUTH TIER	INSIDE	AST/REACTOR	500	STEEL
0471	R	0032	TC REACTOR/PESTICIDE PROD	UNKNOWN	SOUTH TIER	INSIDE	AST/REACTOR	500	STEEL
0471	R	0035	TC REACTOR/PESTICIDE PROD	UNKNOWN	SOUTH TIER	INSIDE	AST/REACTOR	500	STEEL
0471	R	0058	TC REACTOR/PESTICIDE PROD	ONE LINE MARKED SULFURIC ACID	SOUTH TIER	INSIDE	AST/REACTOR	500	STEEL
0471	T	0001	TC REACTOR/PESTICIDE PROD	PROBABLY WATER	SOUTH TIER	INSIDE	AST	~540	STEEL
0471	T	0002	TC REACTOR/PESTICIDE PROD	UNKNOWN	SOUTH TIER	INSIDE	AST	70	STEEL
0471	T	0040	TC REACTOR/PESTICIDE PROD	UNKNOWN	SOUTH TIER	INSIDE	AST	500	STEEL
0471	T	0147	TC REACTOR/PESTICIDE PROD	UNKNOWN	SOUTH TIER	INSIDE	AST	2,000	STEEL
0471	T	0268	TC REACTOR/PESTICIDE PROD	UNKNOWN	SOUTH TIER	INSIDE	AST	550	STEEL
0471	T	1085	TC REACTOR/PESTICIDE PROD	UNKNOWN	SOUTH TIER	INSIDE	AST	2,000	CARBON STEEL
0471	T	1126	TC REACTOR/PESTICIDE PROD	UNKNOWN	SOUTH TIER	INSIDE	AST	586	STEEL
0471	T	1179	TC REACTOR/PESTICIDE PROD	H&d2›SO&d4›	SOUTH TIER	INSIDE	AST	30	STEEL
0471	T	1378	TC REACTOR/PESTICIDE PROD	UNKNOWN	SOUTH TIER	INSIDE	AST	150	STAINLESS STEEL
0471	T	1381	TC REACTOR/PESTICIDE PROD	PROBABLY WATER	SOUTH TIER	INSIDE	AST	110	ALUMINUM
0471	T	1462	TC REACTOR/PESTICIDE PROD	TRIMETHYL PHOSPHATE SOLUTION	SOUTH TIER	INSIDE	AST	360	FIBERGLASS
0471	V	1026	TC REACTOR/PESTICIDE PROD	PESTICIDE	SOUTH TIER	INSIDE	AST/VESSEL	90	CARBON STEEL
0471	V	1028	TC REACTOR/PESTICIDE PROD	UNKNOWN	SOUTH TIER	INSIDE	AST/VESSEL	265	STEEL
0471	V	1112	TC REACTOR/PESTICIDE PROD	UNKNOWN	SOUTH TIER	INSIDE	AST/VESSEL	55	STLES/CS JACKET

TABLE 3-29
ABOVEGROUND STORAGE TANKS INSIDE SHELL BUILDINGS IN THE SOUTH PLANTS AREA
ROCKY MOUNTAIN ARSENAL

BLDG	TPRE	TANK	FACILITY	LAST KNOWN CONTENTS	AREA	IN_OUT	TYPE	CAPACITY (GAL)	ST_MAT
0471	V	1310	TC REACTOR/PESTICIDE PROD	UNKNOWN	SOUTH TIER	INSIDE	AST/VESSEL	370	STEEL/CS JACKET
0471C	V	1161	REFRIGERATION	NITROGEN	SOUTH TIER	INSIDE	AST/VESSEL	275	STEEL
0472	S	1275	THIONYL CHLORIDE REFRIGERATION	UNKNOWN	SOUTH TIER	INSIDE	AST/SEPARATOR	59	STEEL
0472	V	1235	THIONYL CHLORIDE REFRIGERATION	UNKNOWN	SOUTH TIER	INSIDE	AST/VESSEL	89	STEEL
0472	V	1246	THIONYL CHLORIDE REFRIGERATION	UNKNOWN	SOUTH TIER	INSIDE	AST/VESSEL	370	STEEL
0509	V	1251	DET COMPRESSOR/METH CL LIQUIFIER	FREON 22	NORTH TIER	INSIDE	AST	310	STEEL
0509	V	1252	DET COMPRESSOR/METH CL LIQUIFIER	OIL/FREON 22	NORTH TIER	INSIDE	AST/VESSEL	~225	STEEL
0515A	T	1009	ENDRIN/NUDRIN STORAGE	NUDRIN	NORTH TIER	INSIDE	AST	8,000	STEEL
0515A	T	1325	ENDRIN/NUDRIN STORAGE	POSSIBLY MIBK OR ENDRIN/NUDRIN	NORTH TIER	INSIDE	AST	8,000	STEEL
0515A	V	1216	ENDRIN/NUDRIN STORAGE	PROBABLY NUDRIN	NORTH TIER	INSIDE	AST/VESSEL	12,000	STEEL
0521A	T	0001	REFRIGERATION/DCPD CRACKING	UNKNOWN	NORTH TIER	INSIDE	AST	94	STEEL
0521A	T	0002	REFRIGERATION/DCPD CRACKING	UNKNOWN	NORTH TIER	INSIDE	AST	94	STEEL
0525	A	1451	PRODUCT DEVELOPMENT LAB/NUDRIN MFG	ANTIFOAM AGENT	NORTH TIER	INSIDE	AST	55	STEEL
0525	C	1062	PRODUCT DEVELOPMENT LAB/NUDRIN MFG	Cl_2	NORTH TIER	INSIDE	AST/COLUMN	59	STEEL
0525	R	1018	PRODUCT DEVELOPMENT LAB/NUDRIN MFG	MIBK, MeSH, CaO	NORTH TIER	INSIDE	AST/REACTOR	750	STEEL
0525	R	1019	PRODUCT DEVELOPMENT LAB/NUDRIN MFG	MIBK OR BRINE EXTRACT 2	NORTH TIER	INSIDE	AST/REACTOR	3,000	STEEL
0525	R	1021	PRODUCT DEVELOPMENT LAB/NUDRIN MFG	MIBK AND BRINE EXTRACT 2	NORTH TIER	INSIDE	AST/REACTOR	3,000	STEEL
0525	T	0001	PRODUCT DEVELOPMENT LAB/NUDRIN MFG	PROBABLY HYDRAULIC FLUID	NORTH TIER	INSIDE	AST	90	STEEL
0525	T	0039	PRODUCT DEVELOPMENT LAB/NUDRIN MFG	UNKNOWN	NORTH TIER	INSIDE	AST	500	STEEL
0525	T	0269	PRODUCT DEVELOPMENT LAB/NUDRIN MFG	UNKNOWN	NORTH TIER	INSIDE	AST	370	STEEL
0525	T	1172	PRODUCT DEVELOPMENT LAB/NUDRIN MFG	CRUDE MSAO/BRINE - SEE MISC	NORTH TIER	INSIDE	AST	500	STEEL
0525	T	1285	PRODUCT DEVELOPMENT LAB/NUDRIN MFG	WATER	NORTH TIER	INSIDE	AST	200	STEEL
0525	V	1094	PRODUCT DEVELOPMENT LAB/NUDRIN MFG	PROBABLY MIBK	NORTH TIER	INSIDE	AST	500	GLASS LINED STEEL
0525	V	1109	PRODUCT DEVELOPMENT LAB/NUDRIN MFG	UNKNOWN	NORTH TIER	INSIDE	AST/VESSEL	550	STAINLESS STEEL
0525	V	1110	PRODUCT DEVELOPMENT LAB/NUDRIN MFG	SULFURIC ACID	NORTH TIER	INSIDE	AST/VESSEL	350	STAINLESS STEEL
0525	V	1141	PRODUCT DEVELOPMENT LAB/NUDRIN MFG	VENT HEATER LIQUORS	NORTH TIER	INSIDE	AST/VESSEL	60	STEEL
0525	V	1224	PRODUCT DEVELOPMENT LAB/NUDRIN MFG	Cl_2	NORTH TIER	INSIDE	AST/VESSEL	50	STEEL
0525A	S	1291	REFRIGERATION/ELECTRICAL EQUIPMENT	OIL	NORTH TIER	INSIDE	AST/SEPARATOR	235	STEEL
0525A	V	1222	REFRIGERATION/ELECTRICAL EQUIPMENT	EMPTY	NORTH TIER	INSIDE	AST/VESSEL	19	STEEL

TABLE 3-29
ABOVEGROUND STORAGE TANKS INSIDE SHELL BUILDINGS IN THE SOUTH PLANTS AREA
ROCKY MOUNTAIN ARSENAL

BLDG	TPRE	TANK	FACILITY	LAST KNOWN CONTENTS	AREA	IN_OUT	TYPE	CAPACITY (GAL)	ST_MAT
0534B	V	1097	PLANAVIN MANUFACTURE	PLANAVIN OR PLANAVIN RAW MATERIALS	NORTH TIER	INSIDE	AST/VESSEL	140	STEEL
0534B	V	1102	PLANAVIN MANUFACTURE	PLANAVIN OR PLANAVIN RAW MATERIALS	NORTH TIER	INSIDE	AST/VESSEL	2,000	STEEL
0571	T	0002	ANTI-FOAM AGENT DRUM	ANTI-FOAM AGENT	NORTH TIER	INSIDE	AST	55	STEEL
0571B	T	1518	TANK ROOM	CHLOROFORM	NORTH TIER	INSIDE	AST	13,500	STEEL
0571B	T	1519	TANK ROOM	HAZARDOUS WASTE CONTAINING ORGANICS	NORTH TIER	INSIDE	AST	13,500	STEEL
0571B	T	1520	TANK ROOM	MISC. WASTE LIQUIDS	NORTH TIER	INSIDE	AST	13,500	STEEL
0571B	T	1523	TANK ROOM	BISULFITE	NORTH TIER	INSIDE	AST	310	STAINLESS STEEL
0571B	V	1256	TANK ROOM	WASTE MATERIAL FROM NUDRIN/DET KNOCK OUT POTS	NORTH TIER	INSIDE	AST/VESSEL	1,160	STEEL
0571B	V	1258	TANK ROOM	MATERIAL FROM THE AZODRIN/DDVP VENT LINE KNOCK OUT POTS	NORTH TIER	INSIDE	AST/VESSEL	1,160	STEEL
0724	V	1257	INCINERATOR/PRECIPITATOR/DET	UNKNOWN	NORTH TIER	INSIDE	AST/VESSEL	1,160	STEEL
0729	T	0001	GENERAL PURPOSE WAREHOUSE	UNKNOWN	NORTH TIER	INSIDE	AST	269	STEEL

NOTES:

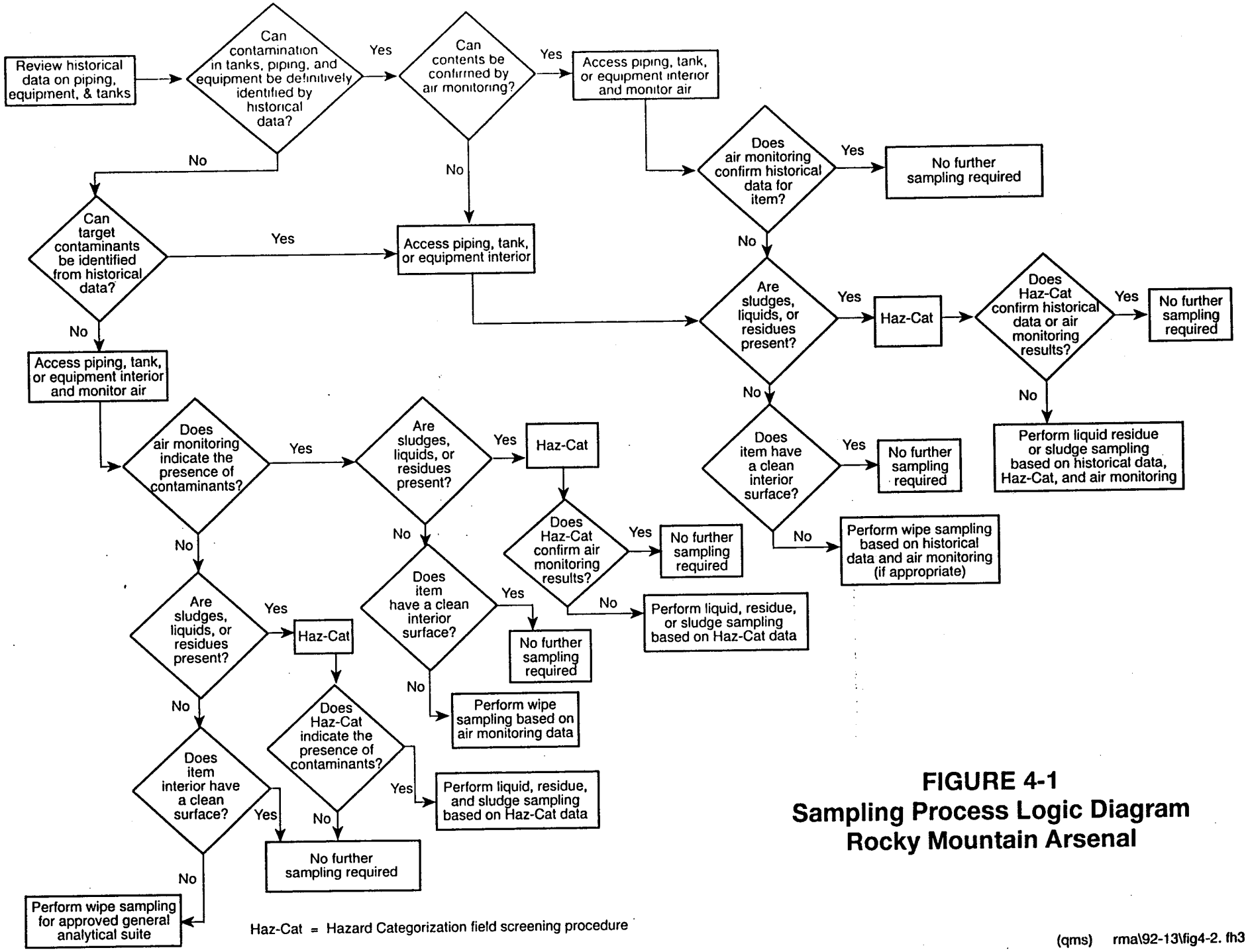
A = air handler
AST = aboveground storage tank
BLDG = building
C = column
CaO = calcium oxide
Cl_2 = chloride
CS = carbon steel
DCPD = dicyclopentadiene
GAL = gallons
H_2O = water
H_2SO_4 = sulfuric acid
LAB = laboratory
MeSH = methyl mercaptain
METH CL = methylene chloride
MFG = manufacturing
MIBK = methyl isobutyl ketone
MISC = miscellaneous
MSAO = methylthioacetaldoxine
N. = northern
PROD = production
R = reactor
S = separator
S. = southern
STLES = stainless steel
ST_MAT = structural material
T = tank
TC = thionyl chloride
TPRE = tank prefix
V = vessel

4.0 SAMPLING AND ANALYSIS

Sampling and analysis is used to supplement information in the contamination assessment to support the decontamination and removal activities. Sampling and analysis is necessary for characterization of the storage tanks, vessels, piping, equipment, and electrical conduit in the South Plants Area of RMA before removal can proceed, if historical data are not conclusive. Results of the sampling and analysis will be used to characterize materials, supplement worker health and safety information, and categorize hazards used to determine if the minimum decontamination that will be performed on all materials needs to be upgraded.

The extent of the sampling and analysis necessary to determine whether the material from the storage tanks, vessels, piping, equipment, and conduit is salvageable or waste is dependent on the condition of the material. Obvious signs of interior corrosion or staining will necessitate characterization sampling and decontamination verification. If the interior appears to be in good condition, hazard categorization will be determined by historical data and air monitoring to determine the safest removal technique. The extent of sampling necessary for each case will be determined by the removal contractor and approved by the Army. Figure 4-1 is a flow diagram used to assist in determining the type and amount of sampling that may be performed.

The following sections, titled Characterization of Materials and Hazard Categorization, describe the circumstances under which different types of sampling will occur and how the information obtained will be used. The specific details of the



Haz-Cat = Hazard Categorization field screening procedure

FIGURE 4-1
Sampling Process Logic Diagram
Rocky Mountain Arsenal

(qms) rma\92-13\fig4-2. fh3

sampling program developed by PMRMA, including data quality objectives, sampling procedures, sample custody procedures, analytical procedures, data management, quality control, and audits, will be supplemented by the removal contractor as necessary.

4.1 CHARACTERIZATION OF MATERIALS

If the piping, tank walls, or portions of the equipment interiors appear to be stained or contain residues of the chemicals that were distributed, stored, or processed, the process history will be used to identify potential contaminants. Characterization sampling to identify the specific chemicals present will be used to determine decontamination and disposal options only if historical information is unavailable or insufficient to plan decontamination.

EPA Level I and II analytical data quality and quality assurance/quality control requirements will be followed for characterization samples. Samples will include sludges, liquids, residues, and wipes.

The most common method for collecting samples from locations that contain no liquid or solid residual is the wipe sample. A wipe pad with extraction solvent is used to wipe a 100-cm^2 area. The extraction solvents used are methylene chloride for pesticide analysis and methanol for metal analysis. The 100-cm^2 wipe sample is collected by wiping the interior of the piping a predetermined distance that has been based on the diameter of the pipe being sampled. The most commonly accepted wipe sampling procedures are those used for PCB sampling. These procedures are based on PCB sampling protocols described in Verification of PCB Spill Cleanup by Sampling and Analysis (EPA 1985).

Sampling points will be located in areas where materials may have accumulated over a period of time, such as low points in the lines or equipment, constricted areas, or containment devices. Generally, access to piping and equipment interiors can be made through removal of fill plugs, sampling ports, or by drilling small holes. Access to the piping and equipment interiors will be made following the appropriate procedures described in the Health and Safety and Sampling plans that will be developed by the removal contractor.

4.2 HAZARD CATEGORIZATION

Hazard categorization is performed before each removal action to determine the safest removal technique. Hazard categorization will be performed as indicated in Figure 4-1. Generally, if the interior appears to be in good condition, hazard categorization will be determined by historical data and air monitoring. If sludges, liquids, or residues are present, screening samples will be taken with an LEL meter, oxygen deficiency meter, photoionization meter, and/or a flame ionization detection meter. The meters individuals use will depend on the item being characterized as described below. In those cases where hazard categorization is inconclusive, characterization sampling will also be performed to further characterize the item.

Results of any hazard categorization sampling and analysis that will be performed before pipes, tanks, and equipment are removed will indicate if the atmosphere is combustible, oxygen deficient, contains mercury vapors, contains liquids, or contains organic vapors. These tests will determine what type of removal method should be used and the level of decontamination. If any hazardous atmospheres exist, engineering controls will be implemented to eliminate the undesirable

condition. If liquid is found, the liquid will be collected, handled, and disposed of in accordance with procedures discussed in Section 7.0.

If hazard categorization samples are collected the number is largely dependent on the type of system that contains the pipes, tanks, or equipment in question. Complicated systems with several low portions, valves, and joints will have more sample locations than a length of pipe with no obstructions.

Hazard categorization of piping begins with determining pipe contents. A pipe may contain air, residual vapors, liquid, or a combination of these. Since this determination cannot be made visually, the pipe must be opened. If there is no joint or valve that can be opened easily to check the contents, a small hole must be drilled and a probe placed inside to check for liquids. After the hole is drilled, the atmosphere will be checked using photoionization detection and lower explosive level (LEL) meters. This atmospheric check will help determine if or how the pipe should be cut after removal of any of the liquids.

In most cases, tank interiors may be visually inspected for residual liquids or solids, and the interior atmosphere checked through access portals. Before the tank is removed, either intact or in pieces, any existing liquids must be drained and interior atmosphere must be made nonhazardous. If residual liquids or solids are present, interiors must be verified as nonhazardous using an LEL meter, an oxygen deficiency meter, and a photoionization meter. To obtain nonhazardous atmospheres, ventilation of the tanks can be either manual or unassisted. Because there are no closed systems that will contain large quantities of hazardous atmospheres, ventilating to the atmosphere will be acceptable. Necessary permits

(e.g., a hot work permit and a confined space work permit) will be obtained before beginning work on tanks or vessels.

Process equipment such as pumps and motors, valves, etc., is sometimes difficult to assess in terms of contamination levels. Small amounts of product may remain within machinery. Piping will be removed from the equipment to the extent possible so that LEL, oxygen deficiency, photoionization detection meters, and flame ionization detection meters may be used to take relevant readings. Equipment not used in process applications, such as fans and heater units, is generally clean if oils and greases do not contain PCBs. To determine if oils and greases contain PCBs, Weston will be contacted.

4.3 WORKER HEALTH AND SAFETY

Worker health and safety is a primary concern on the work site. The results of the characterization of materials and hazard categorization sampling and analysis will be used to supplement the health and safety program described in Section 8.0. The sample results can also be used to verify that the exclusion zone boundaries are of the appropriate size to protect support personnel from exposure to hazards. Fire hazards may be reduced by the hazard categorization to be performed.

5.0 DECONTAMINATION PLAN

This section presents the decontamination plan for the piping, equipment, and tanks in the South Plants Area. The goal of decontamination is to make contaminated materials suitable for disposal, or salvage. To do this effectively and achieve the objectives outlined in the ESD, the decontamination of the piping, equipment, tanks, and electrical conduit is implemented to minimize waste and optimize the amount of materials that can economically be reused or scrapped.

Evaluation of the processes, piping, equipment, tanks, electrical systems, and contaminants is necessary to determine the level of decontamination procedures to use. Decontamination procedures are established based on the level of contamination, the determination of what constitutes a successful decontamination operation, verification of the level of decontamination, and the associated cost evaluation of the decontamination operation. Once an optimum decontamination operation has been determined, which will be based on historical data, visual observation and analytical data, planning for implementation of the preferred decontamination operation can proceed.

The analysis of decontamination alternatives is presented in Section 5.1. This information is to be used as a guide for developing detailed work plans for decontamination and verification procedures for the piping and equipment to be demolished.

Several procedures are incorporated into the approach for decontamination of the piping, equipment, tanks, conduit, and other salvageable materials. The procedures are based on the specific contaminants and demolition requirements for

the various locations. The procedures were evaluated based on a review of the *Detailed Analysis of Alternatives* (EBASCO 1994b) and EPA technical guidance. The methods and requirements are presented in Section 5.2.

Decontamination procedures are evaluated based on best demonstrated available technologies (BDAT) as presented in the Debris Rule Land Disposal Restriction (LDR) 57C Code of Federal Regulations (CFR) 160.5b.(1)(a) (August 18, 1992) and regulatory requirements as detailed in the Explanation of Significant Differences (ESD) (PMRMA 1992). To determine if the decontamination techniques are successfully removing or neutralizing the contaminants, verification procedures will be incorporated. These verification procedures are presented in Section 5.3.

5.1 ANALYSIS OF DECONTAMINATION ALTERNATIVES

Several alternatives for implementation of the necessary decontamination of the storage tanks, vessels, equipment, piping, and conduit were evaluated. The following two alternatives were chosen as superior options for the decontamination procedures presented in Section 5.2:

- use of the decontamination facilities at CERCLA Wastewater Treatment Facility (CWWTF); and

- work zone decontamination.

The preferred choice is a combination of these alternatives depending on the complexity of the demolition site and the amount of material being handled, decontaminated, salvaged, and disposed of. The combination allows rinsing of

large pieces of equipment and more extensive decontamination to be performed economically.

5.1.1 CERCLA Wastewater Treatment Facility

The decontamination facility associated with the CWWTF should be used for rinsing large pieces of equipment during the course of decontamination. Very large equipment that is not grossly contaminated nor easily handled and will be transported offsite can be properly decontaminated by securing the equipment to a truck bed before the truck is driven through the CWWTF. Another alternative for vehicle decontamination is the South Plants Decontamination Area (SPDA) described in Section 7.7.4. The CWWTF cannot handle the decontamination of grossly contaminated materials and is, therefore, limited to rinsing vehicles and large equipment with minimal contamination.

5.1.2 Work Zone Decontamination

Work zone decontamination will be the primary method of decontaminating tanks, equipment, conduit, and piping. Tanks will be decontaminated in place, if necessary, to allow for appropriate demolition. After demolition, a more thorough decontamination may be necessary at the temporary decontamination pad. All piping and conduit and some equipment will be decontaminated on the pad.

Temporary decontamination pads are simple, easy to set up, inexpensive, and are easily modified for site location and decontamination method circumstances. Temporary decontamination pads will be composed primarily of a high-density polyethylene (HDPE) liner, sump, high-pressure steam cleaner, and rack to hold and

elevate piping, equipment, curtains to control spray and drift, etc. With this setup, all primary methods of decontamination can be used.

5.2 PROCEDURES FOR DECONTAMINATION

All equipment, containers, tanks, vessels, and piping that were involved in the production, storage, and conveyance of nonagent chemical constituents will be decontaminated before removal from the site. Equipment that is used for the removal and decontamination also must be decontaminated. Equipment will be transported through a work zone temporary decontamination facility constructed to decontaminate vehicles and equipment before they leave the work area. Vehicles that do not enter the work area will not have to be decontaminated.

A temporary decontamination pad for equipment, piping, and tanks will be constructed to minimize contaminant transport offsite. The pad will be located in the contamination reduction corridor. The decontamination pad construction will vary in size according to the location. In general, it will consist of an approximately 35-foot by 12-foot area covered by a 60-mil liner. Four-inch by 4-inch or larger posts will be used as berms to border three sides of the decontamination pad. The liner will be draped over the berms. Drainage will be provided to a sump equipped with a transfer pump to collect decontamination fluids in appropriate containers. Whenever possible, natural grading at the site should be used to ensure that wastewater can be easily collected and has no chance of spilling.

If necessary and if minor grading is allowed, another type of decontamination pad can be constructed. Berms could be made of excavated soils. Trucks could drive

forward into the decontamination area from the exclusion zone and then exit by driving forward into the support zone.

Containers and smaller storage tanks that had been used in the manufacture of pesticides at the site will be decontaminated before removal from their existing location. Decontamination before removal is preferred because of the possibility of explosive or hazardous atmospheres inside the containers. If possible, any work to be performed on the interior of such vessels will be completed through existing access portals. Otherwise, access will be made by cutting an opening using non-sparking tools. Once a tank is accessed, the atmosphere will be monitored following guidelines discussed in Section 4.0. If hazardous atmospheres exist, the tank atmosphere will be inerted before decontamination. Cutting equipment that produces sparks will not be used if the interior vapor concentrations exceed 10 percent of the LEL. No work will be performed until hot work and confined space permits are secured.

Piping and equipment that have not been cleaned satisfactorily through in situ efforts (Section 5.2.3) can be further decontaminated on the pad. Tanks that have not been decontaminated to standard using in situ methods (refer to Section 5.2.1), but that possess LELs that would permit cutting, can also be decontaminated further on the pad.

5.2.1 Methods of Decontamination

Various methods of decontamination were examined and considered appropriate for the cleaning of storage tanks, vessels, equipment, and process piping including hydroblasting/water washing, steam cleaning, and surfactant-enhanced cleaning.

5.2.1.1 Hydroblasting/Water Washing

Hydroblasting/water washing was examined as a potential method for decontaminating storage tanks, vessels, equipment, piping, and conduit. With this method, storage tanks can be decontaminated in place before dismantlement. It would be more appropriate with this method to disassemble the piping before decontamination to facilitate access to the pipe interiors. Advantages of this method are that standard equipment is readily available, and the process is rather straightforward with no special handling requirements. The rinsate is easily collected, handled, and treated. Disadvantages are that the method is only effective on surface contamination; large amounts of rinsate, which require collection, treatment, or disposal, are generated; and other methods may be needed to remove residual contaminants.

5.2.1.2 Steam Cleaning

Steam cleaning was considered in the same manner as hydroblasting/water washing. Experience suggests this method is appropriate for cleaning tanks before removal and cleaning piping after removal. The advantages are that steam cleaning will generate less rinsate/condensate than hydroblasting/water washing, and extensive use of this method has proven effective for removal of pesticides, organic solvents, heavy metals, acids, alkalis, dioxins, and PCBs. The disadvantages are that this technique is effective for removal of surface contamination only, and additional techniques could be necessary for removal of residuals. Also, volatile, semivolatile and metal contaminants may be volatilized by this decontamination

technique. Depending on the amounts of material volatilized, systems may need to be implemented to capture this residual volatilized material.

5.2.1.3 Surfactant-Enhanced Cleaning

The technique of surfactant-enhanced cleaning is generally used with low-pressure water washing systems. The system was investigated for use as a touch-up method for the removal of pesticide contamination from tanks and piping surfaces. The surfactant combined with water washing would be appropriate if the primary method of decontamination is insufficient. Surfactant solutions have proven effective on metals contaminated with pesticides. A disadvantage of surfactant solutions is that a liquid waste is generated, and disposal of the liquid waste is difficult.

5.2.1.4 Conclusion

Considering the available techniques examined, the methods that appear most appropriate for this task are hydroblasting/water washing and steam cleaning, combined with surfactant water washing as a follow-up measure for residual contamination removal. The specific decontamination procedures to be used are described in the following sections.

5.2.2 Requirements for Decontaminating Tanks and Vessels

The following steps should be implemented for the decontamination of containers, small tanks, and vessels:

- Make certain any pipes leading to the tank are either disconnected or blinded.

- Remove access portal.

- Test the interior atmosphere with a LEL meter and HNu photoionization meter.

- Remove any standing product from the interior of the vessel and handle according to the guidelines in Section 7.0.

- Wash the interior of the vessel using a high-pressure hot-water cleaner with a detergent.

- Remove the wash water from the vessel.

- Triple rinse the vessel with potable water using the high-pressure equipment and evacuate the tank after each rinse.

For decontamination verification, the procedures outlined in Section 5.3.1 of this document will be followed. If primary decontamination is not sufficient to render the tank fit for scrapping, additional decontamination procedures may be implemented if practicable. If additional decontamination procedures are required, the vessel will be cut into sections to facilitate mechanical scrubbing of the interior surfaces with a surfactant formula. Cutting of containers will only be allowed if LEL readings of the vessel interior are sustained at 10 percent or lower of the products' LEL. The following is a description of the process:

- The surfactant is applied to the surfaces to be decontaminated.

- The surface is then scrubbed. The surfactant will be left on the surface for approximately 15 minutes.

- The surfaces will then be thoroughly rinsed.

The preceding decontamination procedure for tanks and vessels will be conducted on the site decontamination pad. This includes removing remaining product from the tank and evaluating the LELs. If decontamination to render the tank fit for scrapping is not practicable, it will be disposed of in accordance with Figure 7-1. The generator will make decisions required per Figure 7-1.

5.2.3 Requirements for Decontaminating Piping

Piping used for carrying constituents required in the manufacturing processes conducted in the South Plants Area will be decontaminated after removal from the existing framework. The piping will be decontaminated onsite at the temporary decontamination pad. It is anticipated that the lengths of piping and numerous connections and elbows will limit access to the pipe interiors while it is in place. Possible numerous leaks would render attempts to decontaminate the pipes in place ineffective. Decontamination procedures will be performed at the work area or at a central location. The following procedures will be implemented for the decontamination of piping:

- Any residual product will be removed and contained.

- Cut or physically dismantle the pipe into lengths that allow them to be decontaminated. Typically, the pipe lengths will be no greater than 18 feet;

however, this will vary with diameter. Pipe ends must remain open for decontamination access to the interior. (Refer to Section 6.0 for removal techniques.)

- Remove any solid materials from within the pipe by use of appropriate methods. The pipe's contents will be placed into drums. These drums should be reserved for compatible materials.

- Place the pipe in the temporary decontamination area.

- After a wash and triple rinse, visually verify that the decontamination is successful.

- If the verification process shows contamination, proceed with surfactant wash procedures if practicable.

- If the piping cannot be decontaminated practicably, it will be disposed of in accordance with Figure 7-1. The generator will make decisions required per Figure 7-1.

5.2.4 Requirements for Decontaminating Equipment

Equipment, in general, should be decontaminated following procedures similar to those used for the process piping. Pumps, valves, or other similar pieces of equipment may not be cleanable to meet the necessary standards because the complicated mechanisms inside them may hold residual product or wastewater. In this case, the equipment will be separated as and labeled as waste for disposal.

Any equipment contaminated with PCBs will be handled by Weston. (Refer to PCB policy letter in Appendix D.)

Equipment that was not used in process activities can simply be rinsed to remove dust that may contain contaminants. In the case of large nonprocess equipment, rinsing may be best accomplished by securing the piece of equipment to a truck bed and driving the truck through the decontamination facilities at the CWWTF. This equipment can then be made ready for reuse or scrapping through DRMO.

5.2.5 Requirements for Decontaminating Miscellaneous Nonprocess Equipment

Other materials that were not directly used in chemical process activities may be removed as part of the demolition process, but they may require some decontamination. These materials include copper tubing used as steam tracers, conduit, and copper wire.

Copper tubing, because of its use as a steam tracer, may be contaminated with mercury. A mercury vapor analyzer should be used to detect any contamination. If mercury contamination exists, refer to Section 7.2.1 for guidance on how to dispose of mercury.

Electrical conduit at RMA has the potential of being contaminated on the exterior by dust and by asbestos used as an insulation material. Decontamination would require rinsing the exterior with water, but would not require interior decontamination. The equipment can then be stored with other decontaminated piping and reused or scrapped.

Electrical wires at RMA can be classified into two groups: wire from within electrical conduit and loose wire. Wire from within conduit is considered noncontaminated and can be drummed for salvaging. Wire that was loose and exposed to dust will be rinsed before drumming.

5.3 VERIFICATION PROCEDURES

The verification procedures applicable to decontamination of equipment will be dependent on the ultimate disposal or salvaging technique. Equipment will be classified as waste if it cannot be decontaminated for scrap or reuse.

5.3.1 Verification Procedures for Tanks and Vessels Only

An empty tank or vessel with an atmosphere that was not hazardous when the item was first accessed or which has been decontaminated using the BDAT identified in Section 5.2 is not considered hazardous. Therefore, verification procedures are very similar to those for piping debris for ultimate recycling or subtitle D disposal described in Section 5.3.2. The visual inspection procedures are as follows:

- Observe removal of any product existing in the container and document amounts.

- Observe and record decontamination activities to ensure proper methods are employed.

- Record identifying tags or numbers on the container before demolition or removal.

- The "clean debris surface" standard in the land disposal restrictions (LDRs) for hazardous debris shall be used as the visual inspection standard.

Verification through sampling is not required for tanks or vessels considered nonhazardous. Sampling is not required under the empty container rule 40 Code of Federal Regulations (CFR) 261.7, and containers can be scrapped or disposed of in landfill units onpost or offpost if the empty container criteria are met.

5.3.2 General Verification Procedures

When piping, equipment, conduit, and tanks are removed, the material is considered debris. There are several possible disposal options for debris. These are treating debris as (1) nonhazardous waste, (2) hazardous waste under existing LDRs, or (3) salvageable material.

Visual inspection is the only verification procedure and requirement necessary for piping debris under LDRs. LDRs state that if the debris is decontaminated following BDAT, "metal objects must be treated to remove foreign matter adhering to the metal to produce a clean debris surface," in accordance with CFR Volume 57 No. 160, August 18, 1992, Subtitle C, Section 5b.(1)(a). LDRs define a clean debris surface as a surface that "when viewed without magnification, shall be free of all visible contaminated soil and hazardous waste, except that residual staining caused by soil and waste consisting of light shadows, slight streaks, or minor discolorations, and soil and waste in cracks, crevices, and pits may be present

provided that such staining and soil and waste in cracks, crevices, and pits shall be limited to no more than 5 percent of each square inch of surface area," CFR Volume 57, No. 160, August 18, 1992, Subtitle C, Section 5b.(1)(a).

The decontamination technologies specified in Section 5.2 were chosen because they are BDAT, as required by LDRs for hazardous debris, and are appropriate for the debris generated by piping, equipment, conduit, and tank removal. Simple visual inspections will be used to verify decontamination of the removed materials. Personnel performing visual inspection will be required to estimate the percentage of staining and soil and waste in cracks, crevices, and pits. Properly decontaminated debris is considered nonhazardous and can be disposed of in subtitle D facilities or scrapped.

The following are procedures for verification of decontamination:

- Document all product quantities removed from the items.

- Observe decontamination activities to verify that proper BDAT procedures are followed.

- Estimate percentage of staining and soil and waste in cracks, crevices, and pits.

- If staining, soil, or waste remaining exceeds 5 percent, repeat decontamination procedures if practicable.

5.4 DOCUMENTATION OF DECONTAMINATION

Having applied the appropriate BDAT and verification procedures for the salvageable piping, equipment, tanks, and other items, the material must be confirmed clean before transferring custody to DRMO. Field logbooks are used to track information from field operations. Standard records are kept by the salvage contractor on the status of the material. It is the responsibility of the PMRMA Contracting Officer's Representative (COR) for the demolition program to make the appropriate documentation available to the field team from DRMO. The information will be transferred from the field logbooks to the scrap/salvage form and provided to the salvage contractor when the material is picked up.

6.0 PIPING AND EQUIPMENT DEMOLITION, DISMANTLEMENT, AND REMOVAL

This section addresses procedures for the demolition, dismantlement, removal, and disposal of Army-owned material in the South Plants Area of RMA not included in an existing or proposed work element. Demolition and removal will be restricted to process and utility equipment that has been operated and maintained by the Army. Process or utility equipment owned or leased by Shell will not be detailed. Demolition techniques will be described for each characteristic area as defined in Section 3.0. Demolition and removal will occur in the Chlorine Plant/Brine/Utility Service Area, Warehouse Area, Southern Tier Production Area, Shop Area, Production Support Area, and Northern Tier Production Area.

Work activities will usually occur in one demolition area at a time. However, several systems such as the electrical distribution system lend themselves to plant-wide removal rather than area-specific removal. The removal may include ASTs and USTs, process equipment stored in Army buildings, electrical equipment identified as non-PCB (and not necessary to maintain electrical service for other remedial activities in the South Plants Area), process water systems, and large portions of process or utility distribution systems not already identified for demolition, dismantlement, or removal under a work element. Demolition, dismantlement, and removal procedures for the piping and equipment identified in the previous sentence are addressed in the following section.

A demolition procedure that does not complicate, limit, or prevent decontamination from being performed will be selected. Procedures have been evaluated on the basis of technical considerations and cost-effectiveness. Information related to

piping and equipment removal has been collected in sufficient detail to (1) support the approach presented in this section and (2) perform a baseline cost estimate from which the total cost of the proposed demolition, dismantlement, and removal program can be projected.

Work within the South Plants Area will involve the demolition and removal of large process and utility systems. These systems are composed mainly of extended process pipe runs; associated process tanks and vessels; and the supporting utility piping, conduit, and equipment. Several demolition techniques were evaluated by Jacobs during recent field activities. The preferred technique for demolition of small-diameter pipe is cutting with a reciprocating or demolition saw. The best method for demolition of large diameter pipes and vessels is cutting using an acetylene/oxygen torch. Cutting with a torch will be limited to pipes that do not present a flammability hazard.

The best procedure for equipment removal is manual dismantlement, using breaking or cutting as needed. Process tanks or vessels will be removed, decontaminated, and scrapped if practicable. Tanks will be cut to scrap size by an acetylene/oxygen torch. Because of the small volume of tanks that can be scrapped and the high cost associated with hydraulic shears, their use is not considered. Army-owned tanks will be cut to prevent reuse, regardless of size. Any equipment designated as reusable will be cleaned according to procedures described in Section 5.0 and returned to DRMO for resale. These techniques were chosen because they represent the safest, most cost-effective techniques available for the demolition activities proposed in this document.

6.1 PIPING AND EQUIPMENT DEMOLITION PLANNING

Because a number of simultaneous work efforts may be initiated in the South Plants Area at any one time, it is important to plan and schedule demolition activity so that the impact on other programs is kept to a minimum. The complex relationship between demolition activity and other remedial programs mandates detailed scheduling. Scheduling will constitute a major portion of the planning effort and will be performed as the funding becomes available for the various areas.

Before the scheduling of demolition activity can begin, specific demolition techniques must be evaluated for safety (as part of the job safety analysis), technical feasibility, cost-effectiveness, and compliance with identified ARARs.

6.2 DISMANTLEMENT AND REMOVAL PROCEDURES

Piping and equipment dismantlement and removal procedures include options for handling equipment (process vessels, tanks, pumps, and motors) and extensive lengths of piping that may have been installed as part of a structure or process or utility system. Where practical, piping and equipment will be dismantled with the appropriate tools at a pipe flange, union, or other junction. Simple disassembly is the preferred method for process or utility equipment removal. In some cases, complex configurations make disassembly difficult, and techniques including cutting or breaking are viable alternatives for dismantlement.

6.2.1 Dismantlement Strategy and Operations

All piping and equipment to be removed will have been identified as safe for removal following sampling and analysis procedures described in Section 4.0. As a result, piping and equipment may be considered for reuse, scrap, or waste. Close coordination between facilities engineering and dismantling crews will be necessary. The following activities will be required to ensure safe and efficient implementation of the dismantling procedures:

- Before dismantling operations, the supervisor and health and safety personnel will walk through the work area to verify dismantling points from the drawings and to identify any special tools or equipment needed.

- A Job Safety Analysis (JSA) will be conducted to ensure safe operation.

- Proper personal protective equipment (PPE) will be worn, proper personal hygiene will be observed, and first aid equipment will be available.

- The "buddy system" of two or more personnel will be used. All activities will be performed using the buddy system.

- Emergency procedures will be reviewed and modified if necessary.

- PPE and the operation of mechanical safety equipment such as eye wash fountains, ventilation units, and safety showers will be inspected daily.

- Radios and the emergency communication network will be inspected routinely.

- A local communications network will be established requiring the use of two-way portable radios. Radios will be carried at all times by each work crew.

"As built" drawings and any modifications, if available, will be used to identify the most feasible dismantling points during removal of piping and equipment. When possible, bolted or screwed connections will be used as dismantling points. Dismantled piping will be cut into lengths of 18 to 28 feet because rolloff boxes provide up to 28 feet for disposition through DRMO. The piping and equipment will be placed in a uniform fashion in an RMA-approved rolloff for each demolition area in preparation for transfer to DRMO.

6.2.2 Standard Operating Procedures

Standard operating procedures (SOPs) for dismantling piping and equipment will be developed by the removal contractor. Local approval from RMA will be required. Operations may proceed only after a preoperational survey is completed and approved by the COR and the PMRMA Safety, Health, and Environment Office. The SOPs will be developed as part of the detailed work plan and will be included in the Job Safety Hazard Analysis Report. The SOPs will be available at the work sites.

6.2.3 Job Safety Analysis

Hazards associated with dismantlement and removal operations generally can be classified as both physical and chemical hazards. Examples of physical hazards are (1) a fall from an elevated work location or (2) lower back strain from lifting heavy objects. Examples of chemical hazards include (1) spills of residual product from

equipment or piping or (2) ingestion of contaminated soils. Confined or restricted spaces are also of concern during field activities.

To address these potential hazards, the work crew, as part of the daily planning activity, will perform a JSA for each activity. For each operation, the crew will determine (1) the major activities to be completed, (2) the appropriate SOPs, (3) the tools and equipment needed for each step, (4) the method of completion for each step, (5) the hazards evident during each step, and (6) the necessary precautions required before starting the dismantling activity. No dismantling activities will begin until the JSA and all activities identified in the JSA have been completed

6.2.4 Removal Equipment

To assess methods for the dismantlement and removal of single or multiple piping runs and equipment, the following factors were addressed: accessibility, maneuverability, quantity of piping or equipment being removed, type of construction material, potential or known contamination, handling requirements, and disposition. For pipe removal, pipe cutoff saws or torches will be used most often; however, manual disassembly or manual pipe cutters may be more practical in some instances. Equipment removal will require manual disassembly with some use of shear or torch cutting and lifting using a crane or other heavy equipment. Equipment may also need to be sized correctly for either removal purposes or final disposition. Equipment and procedures used for removal and demolition activities will be operated under guidelines specified in 29 CFR 1926, Safety and Health Regulations for Construction.

6.2.4.1 Torch Cutting

To remove piping in the North Plants Area of RMA, TVA most often relied on torches. This approach was implemented successfully in Building 1501, which was one of the primary agent manufacturing process structures. Jacobs also used torch cutting as a primary demolition method in Tank Farm 108, a highly congested area of process piping and equipment located in the Southern Tier Production Area. Torch cutting was an extremely effective demolition technique on properly characterized pipes. With torches, equipment and operation and maintenance (O&M) costs are moderate.

Torch cutting requires skilled laborers and a rigorous health and safety program. General requirements for the safe operation of torch cutters are provided in 29 CFR 1926 Subpart J. Before any torch cutting is performed, the appropriate hot permits will be obtained from the PMRMA fire department.

6.2.4.2 Demolition Saw

Demolition saws are appropriate for use with pipe diameters up to 4 inches. They can be used to cut carbon steel, aluminum, and to a lesser extent stainless steel. In previous demolition activities at RMA, the demolition saw was mainly used to cut electrical conduit. Little training is required to operate a demolition saw safely and efficiently. The electrical components of the saw are intrinsically safe; however, great amounts of sparks are generated during operation. This saw cannot be used in potentially hazardous atmospheres. Because of the sparking, using a demolition saw is considered a hot-cut method and requires the completion of hot work permits. While operating a demolition saw, the appropriate PPE must be worn to

protect the operator from the sparks. General requirements for safe operation of power tools are provided in 29 CFR 1926 Subpart I.

6.2.4.3 Reciprocating Saw

A "Sawzall" brand reciprocating saw or equivalent is appropriate for use on pipe diameters of less than 4 inches (nominal size, standard weight). These saws use interchangeable blades for cutting many different materials such as steel or cast iron. Set up time is minimal, and little training is required to operate a reciprocating saw in a safe and efficient manner. Choosing the correct blade is essential. Using a blade inappropriate for the cutting matrix can result in excess wear on the saw and an increase in operating expenses by having to replace too many broken blades. Most reciprocating saws are Underwriters' Laboratory (UL) listed for Class AAA hazardous environments, but they can still spark during normal operation. Extreme care must be demonstrated while using a reciprocating saw in hazardous environments. Reciprocating saws will be used mainly to supplement the demolition saw for cutting small diameter electrical conduit and to work on process equipment and pipes that have the potential to contain flammable or volatile atmospheres. The reciprocating saw also works well to cut lightweight brackets and supports for the electrical conduit. All uses of a reciprocating saw at RMA will be in accordance with 29 CFR 1926 Subpart I, which outlines the requirements for the safe and proper use of reciprocating saws and other power equipment.

6.2.4.4 Manual Pipe Cutters

A common technique for pipe demolition is using the manual pipe cutter. Manual pipe cutters are inexpensive and range in sizes capable of cutting pipes up to 20

inches in diameter. As pipe diameters increase, the room required to operate the cutter also increases. This increase can be a limiting factor especially when presented with one of the many congested production areas within the South Plants Area. Manual pipe cutters also require a significant amount of time to use. Use of manual pipe cutters should be restricted to situations where torch cutting or use of reciprocating saws is either inappropriate (flammable atmospheres) or not feasible (working in area without electrical service). Guidelines for the safe and proper use of manual pipe cutters and other hand tools are provided in 29 CFR 1926 Subpart I.

6.2.4.5 Scaffolding and Man Lifts

A major safety concern is the recognition and prevention of fall hazards that are associated with working on elevated structures. Unique situations may arise during demolition and removal activities that may require the construction of scaffolding or the use of powered man lifts. All elevated work may require the use of lanyards and safety harnesses. Because of fall hazards, the use of ladders for elevated work is discouraged. All equipment and scaffolding will be inspected daily before any work is initiated at an elevated location. All scaffolding, work platforms, and ladders will be constructed and used in a manner consistent with 29 CFR 1926 Subpart L.

6.2.4.6 Heavy Equipment

Several types of heavy equipment will be used to transport, lift, dismantle, demolish, or remove process or utility piping or equipment during demolition activities. Any heavy equipment used during work activities will be operated by trained equipment operators at all times. Load capacities of the equipment will be clearly posted on each vehicle and will be followed. All heavy equipment will be operated and

maintained in full compliance with 29 CFR 1926 Subpart O, regulations for lifting and hauling equipment.

6.2.4.7 Electrical Hoists

Portable hoists and gantries may be used to move piping and equipment. Inspection will include wire ropes, hooks, limit switches, structural integrity, and a load test. Safety inspections will be performed routinely. The capacity guidelines for the specific hoist will be strictly followed. Electric hoists will be operated under guidelines set forth in 29 CFR 1926 Subpart N.

6.2.5 Electrical Power

Whenever possible, power lines near demolition areas will be de-energized, and lockout/tagout procedures will be used to prevent reactivation while workers are in the area. Electrical power will be required for most demolition and removal activities in the South Plants Area. On an as-needed basis, power will be cut or restored for selected structure or demolition zones. When appropriate, portable generators will be used. Portable ground fault circuit interrupters will be used for all 120-volt, alternating current power supplies. Close communications with the facilities maintenance branch will be maintained, and lockout and tagout procedures consistent with 29 CFR 1910.147 will be followed.

6.2.6 Records

Each contractor will be responsible for recording vital information regarding the demolition or removal of process or utility equipment and pipelines. Each piece of

removed equipment will have an inventory tag attached to it for tracking purposes. All tanks, columns, or vessels will be certified as decontaminated and not available for reuse when submitted to DRMO. All waste material generated as part of this demolition program will be tracked from the point of generation to its final disposition. Records will be initiated and maintained for daily safety meetings, employee and visitor logs, real-time monitoring, and sample collection activities. Records of weekly inspections of waste storage areas will also be generated and maintained.

6.3 SOUTH PLANTS AREA DEMOLITION AREAS

The seven areas, as described in Sections 3.1 through 3.7, will be used to plan the demolition. The areas include the Chlorine Plant/Brine/Utility Service Area, the Warehouse Area, the White Phosphorus Area, the Southern Tier Production Area, the Shop Area, the Production Support Area, and the Northern Tier Production Area (Figure 3-4). These areas represent distinct operational zones within the South Plants Area. The following section provides guidance on general demolition, dismantlement, and removal techniques that will be used during field activities associated with this program. In evaluating the removal and dismantlement of concrete tanks (USTs) and sumps, it has been determined that it is unlikely that any removal actions will be appropriate because salvageable material is unlikely and only waste (hazardous and nonhazardous) will be generated. Removal of concrete tanks and sumps will likely be part of the soils remediation program.

6.3.1 Chlorine Plant/Brine/Utility Service Area

It is anticipated that a majority of the demolition work for the tanks and piping can be performed with torches. Conduit and equipment will be removed with demolition saws and hand tools (bolt cutters, wrenches, and other removal tools). Before torches are used on pipes or tanks, the atmosphere will be sampled for LEL and an appropriate hot work permit will be obtained. Reciprocating saws will also be used to assist in removing brackets and clamps. Some disassembly of equipment may be necessary and the use of disassembly techniques will optimize salvage where practicable.

6.3.2 Warehouse Area

Conduit is best removed (after it has been confirmed that all lines in the area are inactive) with demolition saws. Lightning protection systems can be quickly removed from structure exteriors with pliers, hammers, chisels, and crowbars. Removal of the USTs is more difficult and may take considerable preparation (purging and cleaning) before demolition. Before demolition, inerting of the tanks will be performed using dry ice (CO_2) or nitrogen. Care will be taken to decontaminate tank seams and joints before applying demolition techniques to these tanks.

6.3.3 White Phosphorus Area

Minimal equipment is associated with this portion of the nonagent CPRA IRA because most items in this area are associated with white phosphorus production. No removal actions will be performed because the piping, conduit, tanks, and

agent-related equipment and will be handled under the agent CPRA-IRA. It is best to perform all of these demolition activities as a single action.

6.3.4 Southern Tier Production Area

The Southern Tier Production Area primarily contains Army processes. Demolition, dismantlement, and removal should be straightforward. All techniques for demolition, dismantlement, and removal will be incorporated. Caution must be exercised for all operations, and atmospheres must be checked for LEL. Conduit must be de-energized and locked out/tagged out. Much of the work will also be performed at elevated locations. The safe use of scaffolding and man lifts will help the work proceed smoothly and safely.

6.3.5 Shop Area

Demolition activities in the shops area primarily consists of utility service lines. Most of the work will be performed with torch cutters. Minimal equipment is present, and the conduit can be removed with demolition saws. It is expected that some of the ASTs were used to store solvents and caution needs to be used before torch cutting these tanks.

6.3.6 Production Support Area

Similar to the Shop Area, the Production Support Area is predominantly utility service piping, and torches can be used for most pipe demolition activities. Electrical conduit can be removed with demolition saws. Some equipment is easily removed and salvageable. No ASTs are present in this area.

6.3.7 Northern Tier Production Area

The Northern Tier Production Area is a mix of both Shell- and Army-identified actions. The external work is extensive for process piping and conduits. Much of the piping was identified in Shell historical documentation. If no records are found to confirm that piping was adequately flushed with water, sampling of the piping will be performed to properly characterize the piping before removal. The breakout of currently identified Army-only actions is shown in Tables 3-22, 3-24, 3-25, and 3-26. It will be necessary to perform sampling for process piping before torch cutting to make certain that atmospheres are not flammable or explosive. Torch cutting is again preferred and extreme caution must be exercised when doing hot work. Conduit will be cut with demolition saws and equipment can be removed after disassembly or detaching. The tanks in the Northern Tier Production Area will likely not be torch cut because of Shell-identified actions or agent-related actions, or because the tanks have been identified as made of plastic.

6.4 DEMOLITION PROGRESSION

As stated previously, the work activities described in this document will usually take place in one demolition area at a time. Careful and detailed planning is needed to manage future work efforts so that their impact on other existing or planned remedial activities can be minimized. Ideally, task-designated crews could rotate through the South Plants Area demolition area. For instance, a crew specifically trained for AST removal could start in the Chlorine Plant/Brine/Utility Service Area and then move to the Southern Tier Production Area while a crew specially trained

for UST removal moves in the same direction approximately one to two weeks behind them.

By using designated crews undertaking specialized tasks, the work effort can be streamlined and costs and safety concerns minimized by closer management control. This method has been identified as the safest and most cost-effective demolition strategy and will be used on most demolition and removal activities in the South Plants Area. However, several of the utility systems lend themselves to removal on a facility-wide basis. This section will first describe operations that could be initiated throughout the facility and, second, address demolition activity best initiated in one specific demolition zone. Lists of equipment, crew sizes, and a description of the proposed demolition activity will be included in each subsection.

In the South Plants Area, a distinction between Army and Shell response actions has been identified. To determine the separation, removal contractors need to refer to Section 3.0 of this document, the Settlement Agreement (United States and Shell 1988), and the PMRMA COR. The actions taken for Shell items will be the responsibility of Shell at the time they deem appropriate (consistent with the ROD). Shell may also decide to perform some of the response actions consistent with this document or they may authorize PMRMA to perform the removal as part of a response action (pursuant to the Settlement Agreement). If Shell authorizes PMRMA to perform the removal action, the progression described in this section can be applied.

6.4.1 South Plants Operations

Two distinct systems that can best be removed at the same time throughout the South Plants Area of RMA have been identified. Removal procedures for each of these systems will be addressed separately in the following sections. These systems include the electrical distribution system and the rail transportation system. Any required decontamination necessary for removal operations of the electrical distribution system and the rail transportation system will include temporary mobile decontamination facilities for the salvageable materials.

6.4.1.1 Electrical Distribution System

Most of the existing electrical distribution system in the South Plants Area of RMA is no longer used and considered obsolete. Electrical service enters the South Plants Area through the primary RMA substation located just west of the Chlorine Plant/Brine/Utility Service Area. It is proposed that RMA facility maintenance personnel identify, if possible, any complete circuit(s) that are no longer used. Electrical service crews, in accordance with Occupational Safety and Health Administration (OSHA) 1926.950 (d), will then remove all electrical distribution systems components from the circuit throughout the South Plants Area that may be practicable. Crews will carefully remove all equipment and decontaminate it for potential salvage. All nonresalable items will be sold for scrap or sent offsite for disposal through DRMO or its contractor. All scrap copper wire will be removed from conduit and delivered to DRMO for resale. All oils from designated non-PCB transformers or capacitors will be contained at the point of generation and delivered to DRMO to be used in a fuels recovery program. This program would be best approached as a facility-wide contract with the option to mobilize multiple work

crews. Equipment for this component would be minimal. For each work crew, equipment would include one crew vehicle, one bucket truck, hand tools, and several drums for waste material. Periodically, a boom truck may be used for lifting or removal of large equipment. It is expected that not much if any of the electrical distribution system will be of any value. This work will not be performed if it is not practicable.

6.4.1.2 Rail Transportation System

Many RMA railroad lines are no longer used. Rail lines that are required for future remediation programs will be kept in place and left intact. The status of the rail lines will be verified with PMRMA. Removal of unneeded lines could be accomplished in a timely and cost-efficient manner using a dedicated team to perform the removal throughout the South Plants Area. This component will require little, if any, decontamination of the rail and generate significant volumes of rail that could be resold for reuse or at least as scrap. A crew of four laborers, including one equipment operator, could remove most of the unused rail. Using mainly hand tools, crews will lift the scrap rail from the railroad bed. Using either a forklift or a boom truck, the rails will be lifted to the transport vehicle, preferably a flatbed truck. Next, the rail will be delivered to DRMO or, if necessary, passed through CWWTF to decontaminate the rail before it is turned over to DRMO. The ties will be disposed of following the procedures described in Section 7.0.

6.4.2 Chlorine Plant/Brine/Utility Service Area

This area contains five Army structures that are of interest to this study. Demolition and removal of both the ASTs and the USTs in this area should proceed only after

all utility systems, including any PCB cleanup, have been removed. Also, the removal and decontamination of large volumes of obsolete equipment can be initiated. Work in this zone is complicated by the fact that most of the existing pipe runs, ASTs, USTs, and obsolete equipment are close to each other. Carefully scheduled activities will be necessary to manage work in this area.

6.4.3 Warehouse Area

Demolition and removal activities in this area will be minimal. Removal of existing electrical and steam distribution systems can be addressed with the facility-wide removal approach. A small amount of salvageable copper and equipment exists in some of the warehouses. These items could be removed, but this may not be cost effective. Several ASTs exist in association with Building 328, the Goop building. These can be removed under a single action. Decontamination and salvage recovery areas can be placed in immediate proximity to Building 328. No USTs have been identified for removal in this area.

6.4.4 White Phosphorus Area

No demolition activities are recommended for this area at this time.

6.4.5 Southern Tier Production Area

Electrical and outlying steam lines can be removed under the facility-wide removal. Specific programs for AST and UST removal should be initiated. The greatest amount of work in this area may be the piping removal. The Southern Tier Production Area contains several distinct production areas. Piping in each of these

areas would best be removed as a separate work effort. Decontamination and salvage areas can be set up adjacent to each separate production area. The Southern Tier Production Area also contains parts of the chemical sewer system. It is unlikely that much of this system can be removed until most aboveground structures have been removed. This area is ideal for accommodating several work crews. Crews trained to sample and determine the contents of pipe runs can be followed through the zone by demolition crews. At the same time, a crew could remove all salvageable equipment and turn it over to a centrally located decontamination area where it would be cleaned and prepared for delivery to DRMO.

6.4.6 Shop Area

Removal within the Shop Area is not expected to be substantial. The small volume of piping and electrical conduit can be removed under the facility-wide program. The two USTs located in this area could be removed by the designated UST team. Likewise, the five ASTs will be removed by the designated AST team. Several pieces of reusable equipment are housed in the Shop Area. At some point, these items can be removed. Suitable areas for decontamination and salvage recovery exist throughout the Shop Area.

6.4.7 Production Support Area

Like the Shop Area, the Production Support Area has little in the way of process equipment or piping. Demolition in this area includes the removal of existing process and utility line. Most likely, these items could be removed as part of the removal of the Southern Tier Production Area or Northern Tier Production Area pipe

runs. Two USTs associated with the chemical sewer system will also be removed. These USTs are outside the structures and could be removed at any time.

6.4.8 Northern Tier Production Area

The Northern Tier Production Area is a heavily congested area surrounding the DET Area; therefore, much of the demolition depends on activities in the DET Area. Separate crews for removal of ASTs, USTs, process and utility lines, and recoverable equipment could work simultaneously in this area. As with the Southern Tier Production Area and DET Area, work should normally progress from east to west. Salvage and decontamination areas could be set up in central areas.

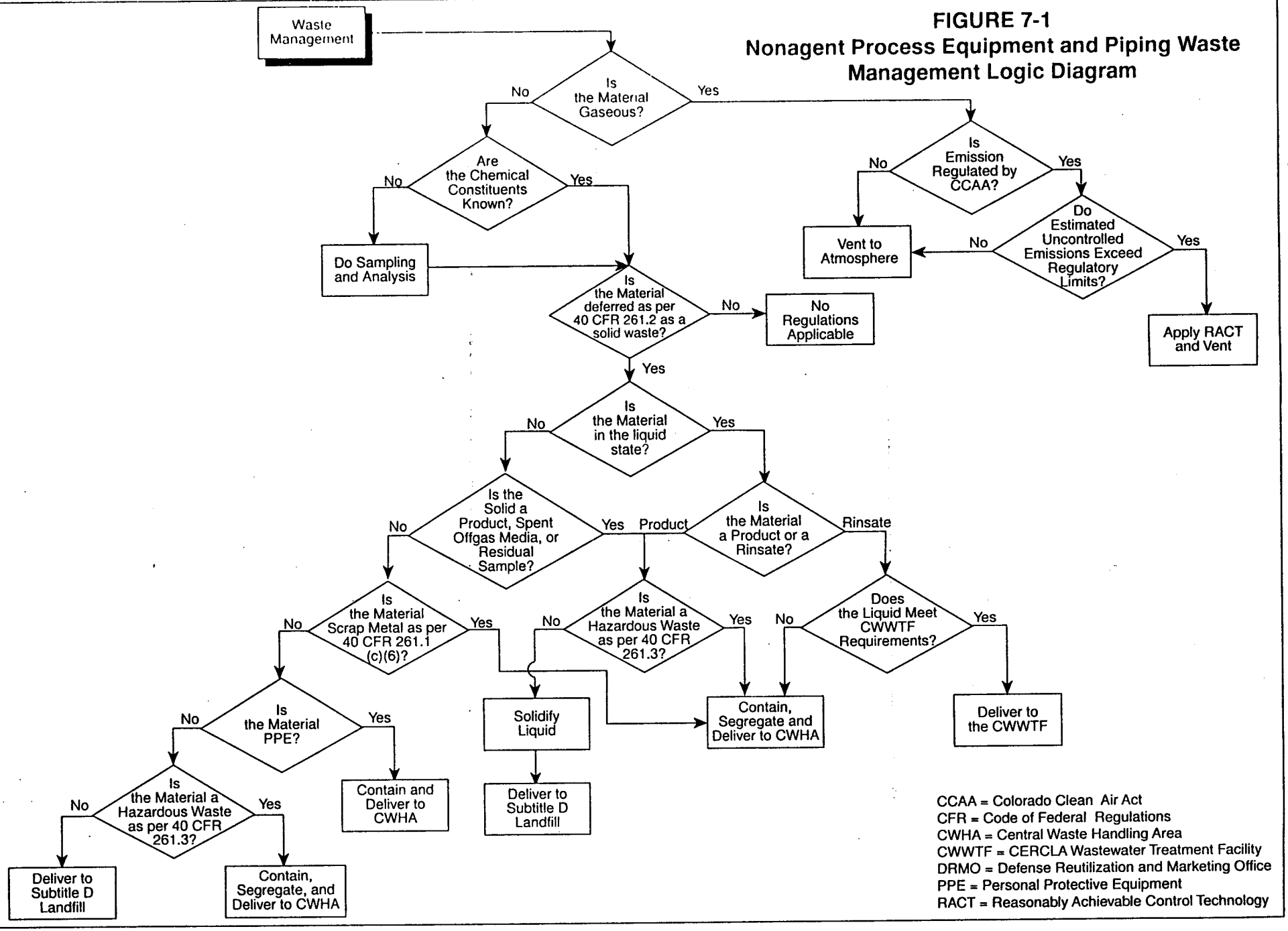
7.0 WASTE MANAGEMENT

Once piping, equipment, and tanks have been decontaminated and removed, the waste from the operations will need to be managed. Waste management practices include the methods and procedures necessary to characterize, track, and dispose of waste and salvageable material resulting from the nonagent piping and equipment removal, decontamination, and disposition. Waste management operations will adhere to all local, state, and federal regulations regarding proper identification, segregation, packaging, labeling, and transportation of waste and salvageable materials generated during demolition activities in the South Plants Area.

7.1 WASTE MANAGEMENT PLANNING

Waste generated during the piping and equipment decontamination and demolition activities requires management to ensure compliance with specified CERCLA cleanup standards. Materials will be classified as either hazardous or nonhazardous. Waste will be identified and classified as defined in 40 CFR Part 261, Determination of Listed or Characteristic Wastes. To manage these wastes, a comprehensive waste management program has been developed. The waste management program addresses characterization, segregation, packaging, labeling, transportation, and the use of a manifest or similar waste tracking system. In addition, discussions of worker safety, emergency spill response, and sampling and analysis for unknown materials are included as a part of the waste management program. A waste management logic diagram is presented in Figure 7-1.

FIGURE 7-1
Nonagent Process Equipment and Piping Waste Management Logic Diagram



rma\92-13\nonagent.fh3

Waste management procedures for hazardous and nonhazardous waste at RMA are detailed in *Waste Management Procedures at Rocky Mountain Arsenal* (Harding Lawson Associates [HLA] 1993). These procedures specify the approach and documentation required by the waste management contractor at RMA.

7.2 WASTE GENERATION

As part of the ongoing waste minimization program initiated at RMA and to the maximum extent possible, removed material will be reused or scrapped. Materials that cannot be reused or scrapped will be disposed of as waste.

All waste generated as part of demolition activities will be characterized in accordance with state and federal solid and hazardous waste regulations. All waste will first be characterized to determine whether its physical state is gaseous, liquid, or solid and then classified as either a nonhazardous material or as a listed or characteristic hazardous waste. Waste material will be characterized by process history, operator knowledge, and chemical analysis. Although it is not anticipated that piping and equipment are contaminated with significant amounts of pesticide-related waste, the following general wastes or material may be encountered or generated:

- asbestos;
- coal dust;
- PCBs;
- fly ash;
- oil and lubricants;
- hydraulic fluid;

- mercury;
- lead paint;
- lead acid batteries;
- coal tar;
- boiler bottoms;
- sludge or sediment;
- refractory brick and mortar;
- decontamination and rinse water;
- structural debris;
- used PPE;
- process liquids;
- soils;
- railroad ties and rail;
- trash; and
- electrical wiring and components.

The sampling, decontamination, demolition, and removal programs will generate a large variety of waste material. These wastes can, however, be classified into two general categories: (1) solid waste and (2) liquid waste. These classifications will be determined by waste characterization, which is discussed in Section 7.3.

7.2.1 Solid Waste

Solid waste will include excess sample media, residual solids or sludges, paint flakes, tank scale, fiberglass insulation, disposable PPE, spent offgas media, spent water filter and separator media, hazardous debris, nonhazardous debris, and metals that cannot be salvaged or decontaminated. To minimize final hazardous

waste volumes, waste will be segregated to make certain that nonhazardous waste is not mixed with hazardous materials.

Tanks and other process-related equipment and pipelines may have residuals or accumulated materials. Accumulated materials will be separated by process type and placed into drums. These accumulated materials will then be sampled and characterized for acceptance by the Central Waste Handling Area (CWHA). If these materials are classified as hazardous waste, they will be disposed of through the CWHA at a Resource Conservation and Recovery Act (RCRA)-permitted Subtitle C facility: the Highway 36 Landfill facility. This process is tracked by the removal contractor. Disposal of any hazardous material requires the use of Department of the Army (DA) Form 2765-1 and a waste characterization data sheet. Ultimate disposal of any hazardous waste material will be reported to the OAS in the Completion Letter.

The level of hazard associated with the PPE depends on the work area. Clothing used in many areas must be impervious and durable, allowing wet decontamination. Gross decontamination of discarded PPE will be followed by a thorough triple rinse with potable water. The decontaminated PPE will be considered nonhazardous, segregated, and stored at the designated accumulation points. Sediments and sludges collected from heavily soiled and contaminated PPE will be handled in a manner similar to that used for residual wastes discussed previously.

When a drum has been filled, it will be closed, sealed, and transported to a designated accumulation point for storage. After laboratory analysis is completed, the drummed waste will be delivered to CWHA, and subsequent arrangements may be made for offsite disposal through DRMO.

The probability is high that elemental mercury may be encountered during demolition activities. Before any demolition, items containing mercury will be removed and the elemental mercury recovered. The mercury, most likely contained in electrical switches or thermometers, will be removed to prevent the release of mercury into the environment. Mercury vapors have also been detected in steam lines during demolition activities at RMA. Recovered mercury may be sold to a refining company through DRMO. The purity of recovered mercury must be verified before it is sent to DRMO for reuse. The following procedure will be followed to ensure the safe and efficient removal of all mercury-contaminated items.

A field crew will survey each work area to identify all equipment potentially containing mercury. Each item will be visually inspected to identify the condition of the mercury item and to verify if any leaks are present. A Jerome Mercury Analyzer will be used during this inspection. The field crew will then remove each mercury item. Removal of each item will be recorded in a task-specific field logbook. The location, time, date, type of item removed, and person responsible for its removal must be recorded in the field logbook. Next, the item will be transported to a central location where the mercury will be drained and the housing decontaminated.

Workers will use Level C protection during mercury consolidation activities. The mercury will most often be contained in a glass ampule or column. If the mercury is intact within the instrument, it will be removed and the housing discarded as nonhazardous. If the mercury has spilled within the instrument, the housing will be considered contaminated. Intact ampules will be broken and the mercury drained into a cast-iron flask commonly called a Bethlehem flask. All contaminated debris including glass and equipment housings will be triple rinsed with a sodium

thiosulfate solution. These items will then be evaluated with the Jerome Mercury Vapor Analyzer. If no detectable mercury vapors are present, these items will be considered clean and discarded as nonhazardous waste. If mercury vapors are present, the mercury-contaminated items will be relinquished to CWHA and disposed of at a contracted RCRA-permitted Subtitle C facility. PPE from this operation will be rinsed with a sodium thiosulfate solution and sent to CWHA. The recovered mercury will be sent in the cast iron flask to a mercury retort unit for reclamation and reuse.

7.2.2 Liquid Waste

Liquid waste generated during field activities will include (1) rinse waters generated through personnel and equipment decontamination and (2) residual liquid products removed from piping and equipment. All liquid wastes will be collected at the site of generation.

Rinse waters generated from equipment and PPE decontamination will be collected during decontamination operations. These waters will be contained in large portable water tanks. The RMA logistics department has several large polyethylene tanks suitable for storage of decontamination rinse waters and may be able to supply several for field activities. This tank must be considered as an accumulation point and managed as such. To meet the requirements of CWWTF (Appendix E), decontamination rinse waters will be filtered during each transfer to separate solids, oils, and greases.

Rinse waters from more than one tank may be combined into the temporary storage tanks. No waters will be combined unless compatibility testing has been performed.

Samples from the existing bulked waters will be available for this procedure. When bulking operations are necessary, the site foremen will notify the site chemist who will perform the compatibility test by placing equal aliquots of the samples into a glass jar. Careful observation of temperature variance and physical reaction will be noted and recorded in field logbooks. Depending on the results of the field test, rinse waters will be combined or the new batch of incompatible water will be placed into a separate tank. Under no circumstances will decontamination rinse waters be combined without the approval of the site chemist.

Final volumes of decontamination rinse water will be composited, sampled, and analyzed for acceptance at CWWTF. The results from the laboratory analysis will be submitted to CWWTF for review. If the rinse water is accepted by CWWTF, the tank contents can be transferred to CWWTF for treatment and disposal. Rinse waters that are not acceptable by CWWTF will be characterized and packaged for offsite disposal through CWHA.

Residual liquid products will be generated by field activities conducted as part of this task. Fluids collected from tanks and associated piping and equipment will be contained and placed in drums. The size of drum will be determined in the field; the smallest practical container will be used. Small quantities of residual materials will be placed in sample bottles for later consolidation or laboratory packing after analytical data have been evaluated. Each drum will contain only fluid from the same tank or process system. When a container is 90 percent full, it will be transferred to a designated accumulation point and a new drum will be started for that location.

Analytical data obtained from samples of the drummed materials will be provided to CWHA as waste characterization data for evaluation against acceptance criteria. Upon acceptance, the containers will be transported to the facility for temporary storage.

7.3 WASTE CHARACTERIZATION

To arrive at the appropriate conclusions, waste characterization must be applied to the decision points in Figure 7-1. The process of characterizing waste relates to establishing whether the waste is a solid or a liquid, whether the waste is hazardous or nonhazardous, and whether it is appropriate or necessary to sample and provide detailed analyses. This is accomplished in a multiple-step process that includes referring to historical data (process and sampling), performing hazardous categorization field screening, making decisions based on field observations (e.g., real time air monitoring), and sampling (both characterization and waste sampling) as appropriate.

Sections 7.2.1, Solid Waste, and 7.2.2, Liquid Waste, address the most commonly encountered solid and liquid wastes. Visual observation is sufficient to establish whether the waste is solid or liquid.

Hazard Categorization Field Screening. Hazard Categorization Field Screening (Haz-Cat) is performed on a liquid, sludge, or residue. The Haz-Cat kit consists of a series of components that allow for determining if the sample is reactive, corrosive, flammable, soluble, or if it exhibits other target characteristic properties. Figure 7-2 is a standard listing of the types of properties that are usually targeted. Depending on the available work area historical information, the targeted properties can be

Figure 7-2

HAZARD CATEGORIZATION (HAZ-CAT) FIELD SCREENING FORM

Site Name:_____

Tank Number:_____ Date: _____ Time: _____

Product Description:_____

Historical Information:_____

Product Quantity:_____

Product Form	Solid:_____Liquid:____	Sludge:_____
Air Reactive	Positive:_____	Negative:_____
Water Reactive	Positive:_____	Negative:_____
Water Solubility	Positive:_____	Negative:_____
Specific Gravity (sol. neg.)	>1:_____ (sinks)	<1:_____ (floats)

pH (sol. pos.) 1 2 3 4 5 6 7 8 9 10 11 12 13 14
pH paper

Oxidizer Test (sol. pos.): KI paper + HCl	Positive:_____ black or blue	Negative:_____
Sulfide Test (pH > 7) Lead Acetate paper + HCl	Positive:_____ darkens	Negative:_____
Cyanide Test (pH > 7) NaOH to pH > 11; 3 drops rhodanine + 1 drop $AgNO_3$ color change	Positive:_____	Negative:_____
HNu Reading (10.2 eV) photoionization detection	Positive:_____	Negative:_____
Flammable: _____ Propane torch	Combustible:____	Nonflammable:_
Lead Present:	Positive:_____	Negative:_____
Chlorinated Hydrocarbon Test: Propane flame + copper wire or Chlor-N-oil/soil	Positive:_____ green flame	Negative:_____
Pesticide Screening: -Kit-	Positive:_____	Negative:_____
*Organophosphorus:	Positive:_____	Negative:_____
*Chlorinated:	Positive:_____	Negative:_____
Inert: Colorimetric Tubes:	Positive:_____	Negative:_____
Iodine Test:	Color: _____	Compound:____
Cations:	Positive:_____	Negative:_____

Comments: _____

Notes: KI = Potassium iodide NaOH = Sodium Hydroxide eV = electron volts
HCl = Hydrochloric Acid $AgNO_3$ = Silver Nitrate

customized by changing the components of the kit. If the historical information is poor, a comprehensive Haz-Cat kit will be used.

After tank, equipment, or pipeline product is collected, identification of the contents will be completed using historical information, real-time air monitoring, and Haz-Cat field screening. Where sufficient product exists, Haz-Cat field screening will be used to confirm the accuracy of historical information and to provide additional information regarding the chemical and physical properties of the tank, equipment, or pipeline contents. After the physical and chemical properties of the product are determined, compatible wastes from different containers can be consolidated to generate waste streams for disposal or treatment. For example, it is desirable to consolidate chlorine-based pesticides together to form a single waste stream. After compatible waste streams are consolidated, a single composite sample will be collected to characterize the waste stream for disposal.

Before full-scale bulking or consolidation is initiated, a bench-top compatibility study will be conducted to ensure that waste streams are compatible. A bench-study is completed by collecting an aliquot from each item containing a like product. The aliquot drawn from each item will be proportional to the bulk amount of the material in the item that will be combined with other material during the full-scale bulking. For example, the proportional aliquot sizes to be collected from various sized tanks containing chlorine-based pesticides are as follows:

Sample Number	Container Size (gallon)	Percent Full	Aliquot Taken (milliliter)
1	55	100	5
2	55	50	2.5
3	10	100	1
4	100	100	10
5	25	100	2.5

Thus, the composite sample generated to determine compatibility approximately reflects the composition of the waste stream that will be obtained when bulk product from like tanks, equipment, or pipelines are mixed. Waste characteristics to be determined are presented on the Haz-Cat field screening form presented in Figure 7-2.

Characterization Sampling. This is the same procedure as described in the characterization of materials section (Section 4.1) except that the results are used to establish the correct storage, segregation, handling, and disposal of residual waste materials.

Waste Sampling. Upon completion of Haz-Cat field screening and the successful bulking of compatible wastes in a 55-gallon drum, a composite waste sample will be collected and submitted for total waste analysis. Analytical results will be used to characterize the waste for disposal. Total waste analysis will be completed on each waste stream with the analytes being selected based on historical information and Haz-Cat field screening data. If historical information and Haz-Cat results are not available, total waste analyses will include the full suite of RMA target analytes.

The sampling method for waste stored in 55-gallon drums will depend on its physical state (solid, liquid, sludge). Liquid waste characterization sampling will be conducted using glass tubes (thieving rods) that are normally 122 centimeters (cm) in length and 6 to 16 millimeters (mm) inside diameter. Larger diameter thieving rods may be used for more viscous fluids if sampling with a small diameter tube is not adequate. Solid or sludge waste samples will be collected from the drum using stainless-steel spoons or scoops. Solid material aliquots will be collected and

thoroughly homogenized in a stainless-steel bowl before being placed in a sample container.

The procedure for liquid sample collection is as follows:

- The bung top will be removed from the drum. Real-time air monitoring will be conducted concurrently with drum opening.

- The thieving rod will be inserted into the drummed waste.. Before removing the waste, sorbent material will be placed on the top of the drum to contain any spills.

- The waste in the drum will be allowed to reach its natural level in the thieving rod. The top of the thieving rod will be sealed with a rubber stopper or gloved hand.

- The thieving rod will be removed from the drum and the uncapped end of the thieving rod will be placed in a precleaned, approved sample container.

- The sampler will then remove the rubber stopper or thumb from the tube and allow the sample container to fill to approximately 90 percent of its capacity.

- Repeat the above steps until enough quantity of product has been collected for laboratory analysis.

- Cap the sample container tightly with a Teflon-lined cap and affix the proper sample identification tag. Remove contamination from the exterior of the sample jar.

- All pertinent data will be recorded and placed in a sealable plastic bag, which is placed with the sample into a decontaminated cooler containing ice.

- Appropriate chain-of-custody documentation will be maintained. Quality assurance (QA) samples will be prepared, and samples will be delivered to the RMA Logistics Branch, which will arrange shipment to government-designated laboratories.

The storage, segregation, handling, and disposal of solids and liquid wastes, and hazardous and nonhazardous wastes should be guided by applying the knowledge gained from (1) historical data, (2) hazardous categorization field screening, (3) field observations, and (4) characterization and waste sampling results. Applying the information gained from these sources to the Figure 7-1 logic diagram will help guide appropriate waste management.

7.4 SALVAGEABLE MATERIALS

The PMRMA Logistics Branch has identified the following nine materials commonly found throughout the South Plants Area as having significant scrap value:

- light steel;
- heavy steel;
- aluminum;

- cast iron;
- stainless steel;
- high temperature alloy;
- electric motors;
- copper wire; and
- brass.

All or some of these salvageable items will be generated from each demolition site. All scrap metal will be collected at the point of generation. Heavy steel scrap metal will be sized to fit in rolloff bins supplied by the DRMO salvage contractor. Other material can be palletized or loaded in dump trucks and weighed at DRMO. All material will be triple rinsed. The first rinse is made with a decontamination solution appropriate for the last known content of the tank or process equipment. The final rinses generally consist of high pressure and/or hot water. Equipment that is contaminated with PCBs will be handled separately by Weston.

All paint and external coatings will be left on the scrap metals. Under no circumstances will contaminated materials be placed into the rolloff bins for salvage. All solids and rinsates generated during decontamination and salvage operations will be handled in accordance with procedures already stated. The contractor will record the types and volumes of salvageable material generated from each demolition site. This information will be summarized and included as an appendix to the completion report for each task. Documentation will be supplied to DRMO or its designated contractor to verify that all materials being presented for salvage have been adequately decontaminated. All scheduling for delivery of salvageable material to DRMO will be done at least 24 hours in advance.

7.5 WASTE AND SALVAGEABLE MATERIAL STORAGE AND DISPOSAL

Hazardous waste, nonhazardous waste, and salvageable material generated and stored onsite will be managed in accordance with PMRMA policy and be in substantive compliance with ARARs, and federal and state laws and regulations. Strictly controlled waste management procedures are needed to store hazardous and nonhazardous waste as well as salvageable materials during demolition activities. These procedures are intended to regulate salvage recovery and waste storage and disposal methods at RMA in a safe and legal manner. This section describes those management procedures and control measures that affect activities associated with the removal of nonagent piping, process equipment and associated pipelines in the South Plants Area of RMA. General guidelines on the collection, storage, and disposal of hazardous and nonhazardous wastes as well as salvageable materials generated during field activities are also presented.

Some nonhazardous waste (e.g., wastewater, discarded PPE) generated or collected from demolition activities will be contained at each work site. When the nonhazardous waste is contained, it should be scheduled for transfer to the CWWTF or the CWHA when the container is filled. These nonhazardous wastes can be stored indefinitely onsite, but to maintain a clean uncluttered work site, it is much safer and simpler to transfer custody of the filled container as soon as practicable.

Hazardous waste material (e.g., tank sludge and pipe residue) generated during removal operations will be contained at the work site. When the hazardous waste is contained, the site is considered a satellite accumulation point. Hazardous waste can be stored at a satellite accumulation point for an indefinite period if the container is not filled to 90 percent of its capacity (40 CFR 261.11[a][2]). Containers

of hazardous waste exceeding 90 percent of their capacity will have to be collected from satellite accumulation points and moved to a central location to form a collective central accumulation point (if needed). The hazardous waste can be held at the collective central accumulation point for no longer than 90 days. At that time, the hazardous waste must be transferred to the CWHA for disposal.

Satellite accumulation points will be located at each work location as needed. A satellite accumulation point, by RCRA definition, is a temporary hazardous waste storage site where up to 55 gallons of hazardous waste may be accumulated. When the total accumulated hazardous waste volume exceeds 90 percent of the container capacity, it must be transferred to either a 90-day accumulation point or a permitted storage site immediately (i.e., within 24 hours), in accordance with Colorado Hazardous Waste Management Regulations, Part 2623-34(c)(2).

Proper satellite accumulation point management will be achieved by complying with the specified minimum requirements of 40 CFR 262.34 and implementing effective waste management practices. A satellite accumulation point will meet six requirements: (1) containers must be in good condition; (2) containers must be labeled or marked; (3) containers must remain closed except when being filled or emptied; (4) incompatible hazardous wastes must not be mixed in the same container; (5) the hazardous waste and the container must be compatible; and (6) the total hazardous waste amount must not exceed 55 gallons.

While hazardous waste is being accumulated, the containers will be protected from direct sunlight and precipitation. Protection is necessary to maintain container integrity and minimize deterioration of the label. The accumulation point will be located so that accidental spills or waste discharges will not flow directly into the

sanitary sewer systems. If this is not possible, berms will be used. The location will be chosen so that any spill can be confined to the smallest possible area.

The accumulation point must have the necessary response equipment, communication systems, and alarm systems to minimize the impact of a fire, explosion, or any unplanned release of hazardous waste to air, soil, or surface water that could threaten human health or the environment. The types of equipment required will depend on the types of hazardous waste stored at the accumulation point.

Any satellite accumulation point must be identified in the RMA Contingency Plan that specifies the emergency response action that will be taken if an incident or accident involving hazardous waste occurs. The RMA Contingency Plan will be updated to include any new satellite accumulation points before those points are used to accumulate hazardous waste. The plan sets forth procedures and resources that will be used to respond to incidents or accidents. The initial response action will be to call the RMA Fire Protection and Prevention Branch.

All site personnel are required to be trained in accordance with OSHA 29 CFR 1910.120 40-hour safety training. Also, specific training is required for owners and operators of all installations that generate, accumulate, treat, store, or dispose of hazardous waste as defined by RCRA 40 CFR 262.34(a)(4). This training is required to include, at a minimum, contingency plan implementation; procedures for using, inspecting, repairing, and replacing facility emergency equipment; operation of communication and alarm systems; fire control; spill response; and facility shutdown procedures.

7.6 TRANSPORTATION

This section will describe all regulations and established procedures for transportation of hazardous waste on RMA property. Generators (the Army) of hazardous waste during the actions prescribed in this document will be responsible for proper labeling. The transporter assumes responsibility for making certain that containers are not leaking and are labeled correctly. The transporter will also ensure that drum chain-of-custody records are completed before the hazardous waste is loaded or transferred. Any hazardous waste transported on public highways must be accompanied by a Uniform Hazardous Waste Manifest. All containers must be packaged and labeled in accordance with 40 CFR 262.40 and U.S. Department of Transportation (DOT) regulations contained in 49 CFR 172. Any spill must be reported to the Fire Protection and Prevention Branch in accordance with the RMA Contingency Plan.

7.7 ONSITE TREATMENT AND DISPOSAL

RMA has several valuable onsite resources for the storage, treatment, and disposal of hazardous waste generated during field operations. CWHA is used as an interim storage facility for all drummed solid hazardous and nonhazardous waste. CWWTF is a water treatment facility capable of treating most aqueous waste streams. DRMO is a governmental division specializing in the reuse and resale of Army property. DRMO is used for all salvageable materials and offsite disposal of hazardous materials (transferred to the CWHA). Also, the South Plants Decontamination Area is used for gross decontamination of vehicles or equipment and for cleaning the exterior surfaces of drums before they are relinquished.

7.7.1 Central Waste Handling Area

CWHA, located at Building 785, is the only formally recognized temporary storage location on RMA property available for contractor use. CWHA is currently operated by HLA for PMRMA. The point of contact is the Remedial Operations Branch. CWHA will accept all contained solid material and liquid and solid hazardous waste for storage and subsequent disposal, pending determination of disposal actions in the ROD. Furthermore, CWHA supplies drums to contractors that must be used for collection of waste materials. Waste management procedures for CWHA are detailed in *Waste Management Procedures at Rocky Mountain Arsenal* (HLA 1993). These procedures specify the approach and documentation required by the waste management contractor at RMA.

7.7.2 CERCLA Wastewater Treatment Facility

Each liquid waste stream processed through CWWTF must be thoroughly evaluated and must meet treatment criteria shown in Appendix E. Detailed information concerning the generation process and quantitative analytical data must be supplied to the treatment facility manager before any waters are shipped to CWWTF. Approval will be granted on a case-by-case basis. If the liquid wastes are deemed acceptable for treatment, the waters can be scheduled for delivery through CWHA. Wastewater may be delivered by tanker, barrel, or portable tanks. Transportation must be in compliance with all PMRMA policies. All empty drums will be returned to CWHA.

The wastewater treatment acceptance criteria detailed in Appendix E must be satisfied before wastewaters are accepted for treatment and disposal at CWWTF.

The criteria listed in Appendix E are established as operating guidelines for CWWTF. Wastewaters that do not satisfy the acceptance criteria will be given special consideration (likely transferred to the CWHA) and will be handled on a case-by-case basis by the Plant Engineer who can be reached at the Remedial Operations Branch.

7.7.3 Defense Reutilization and Marketing Office

DRMO is responsible when Army hazardous waste is generated and stored pending determination of disposal as specified in the ROD, and when salvageable materials are to be sent offsite. The current points of contact for DRMO are in the PMRMA Logistics Branch.

All hazardous material not eligible for onsite treatment or disposal must be delivered to CWHA by the removal contractor. Waste must be contained and transported to CWHA in accordance with all guidelines specified by PMRMA, and all state and federal regulations. All waste must be approved before acceptance at CWHA. A generic waste characterization data sheet and a completed DA Form 2765-1 must be supplied to CWHA. All appropriate laboratory analysis must be attached to the waste characterization data sheet. Both CWHA and DRMO will review the supplied information against specific acceptance criteria. All waste must be properly labeled and packaged before transport to CWHA. Any questions that arise during this process should be directed to the PMRMA Logistics Branch.

All Army salvageable material must be processed through DRMO unless express authorization for alternative arrangements is obtained from the government. DRMO

has contracts with salvage contractors to receive salvageable materials. RMA demolition contractors must submit a Request For Dumpster form for heavy steel to indicate the amount of salvageable material to be picked up. All other materials will be delivered to DRMO by the demolition contractor, either on pallets or by truckload. The contractor must supply DRMO written verification that all salvageable materials have been properly decontaminated (Section 5.4). All material will be sized to fit in rolloff bins supplied by the DRMO salvage contractor. All material will be properly identified and segregated before pickup by the DRMO salvage contractor.

7.7.4 South Plants Decontamination Area

SPDA is a permanent decontamination pad located in the South Plants Area. SPDA can be used as a gross decontamination area for vehicles or other equipment. Drums that are being returned to CWHA can be rinsed to decontaminate the exterior surfaces. However, it should be noted that PMRMA prefers the use of CWWTF whenever possible. A request to access SPDA should be made in advance to HLA. SPDA may be scheduled for same day usage or, after normal operating hours, by contacting HLA before 12:00 p.m. of that business day. The normal SPDA hours of operation during the summer are 7:00 a.m. to 3:30 p.m. The facility is not operated in the winter.

7.7.5 Records Management

This section will outline the collection, storage, and validation of data associated with the management and disposal of waste material generated during field activities at RMA. The information will be created during the operation and maintenance, and inspection of the waste accumulation areas.

Both electronic database and hard copy historical records systems will be developed and maintained to accommodate the data entry, storage, and reporting requirements for waste management activities. Any existing historical data, both electronic and hard copy, will be incorporated into these systems. The information is required to maintain accurate records of waste stored and treated at RMA. Substantive compliance with RCRA requires that information associated with these wastes and the area inspection reports be maintained in an accessible and usable fashion.

7.7.6 Field Logbooks

Information gathered from the inspection of waste storage areas will be logged in field logbooks onsite. In addition to the field logbooks, site inspection reports will be prepared. Copies of the field logbooks and site inspection reports will be maintained onsite. Historical information, including the original completed field logbooks and existing site inspection reports, will also be maintained in files.

7.7.7 Drum Tracking

A chain-of-custody form will be completed for each drum issued to contractors. Upon receipt of the drum, custody information will be logged in the field logbook and entered into the database system. Custody information will include, but is not limited to, the following:

- date of receipt;
- matrix;

- point of generation (RMA section number); and
- cross-reference to the analytical data.

Copies of the drummed waste chain-of-custody forms, field logbooks, and analytical results will be maintained onsite. Routinely updated inventory reports and copies of the field logbooks will also be maintained onsite. Field personnel will use this information to track drums from the date of issue to the final storage or disposal.

7.7.8 Sample Tracking

The contractor will designate a Data Management Coordinator (DMC) who will be responsible for monitoring the location and status of all analytical samples from collection in the field through the reporting of the results to the Installation Restoration Data Management Information System (IRDMIS) network. The DMC will use information from each chain-of-custody form to establish and maintain a log file for the samples. The log file will be used for sample tracking. Data confirmed through the sample tracking system will be used by waste management personnel to determine the hazardous characteristics, if any, and the final disposition of the drummed waste associated with that sample. This information will be cross-referenced to the drum tracking database for all drummed waste to identify the most appropriate disposal option for these waste materials generated during demolition activities at RMA.

7.7.9 Analytical Management

Analytical parameters will be measured by private offsite contractor laboratories. These laboratories will practice sound analytical management techniques as defined

by commonly accepted industrial specifications. These specifications will include proper chain-of-custody and analytical techniques. Specific elements used to reach this goal will be addressed in the Data Management Plan.

7.7.10 Final Report

A final waste placement report will be prepared by the removal contractor and submitted to PMRMA following completion of demolition objectives. Data gathered from the drum, sample, and analytical results tracking systems will be combined and presented in the final report. In addition, the final report will provide the custody trail of each sample, document the sample's placement into a serialized container, reference the analytical data, trace the waste material to its final storage or disposal destination, and summarize all information used to make waste management decisions.

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8.0 HEALTH AND SAFETY PLANNING

During the decontamination and removal activities presented previously, health and safety requirements will need to be implemented. Health and safety requirements for decontamination and removal of nonagent process piping and equipment will be developed and presented in a task-specific Health and Safety Plan by the removal contractor. The task-specific Health and Safety Plan will consist of supplements to the PMRMA guidance provided on general RMA health and safety requirements. This plan will be prepared to provide guidance to all personnel to perform their work as it relates to the decontamination and removal of nonagent process piping and equipment. Detailed discussions of the following topics will be included in the Health and Safety Plan and are discussed in the following sections:

- Rocky Mountain Arsenal General Health and Safety Planning;
- Hazard Analysis;
- Site Worker Training;
- Personnel Protection;
- Medical Surveillance Requirements;
- Air Monitoring Requirements;
- Site Control;
- Decontamination Procedures;
- Confined Space Entry Procedures;
- Emergency Response Plan; and
- Coordination with Other Activities.

8.1 ROCKY MOUNTAIN ARSENAL GENERAL HEALTH AND SAFETY PLANNING

The Health and Safety Plan that is developed by the removal contractor will be approved by the PMRMA Safety, Health, and Environment office. The Safety, Health, and Environment office will ensure that the plan complies with Army Regulation 385 Series, 40 CFR 1910.120, and general PMRMA requirements.

In addition to approving the Health and Safety Plan, a representative of the Safety, Health, and Environment office will tour the work site occasionally to monitor the progress of the project.

8.2 HAZARD ANALYSIS

The hazard analysis will address the chemical, physical, and task-specific hazards associated with the field activities for the decontamination and removal of the piping and equipment.

Chemical hazards are those associated with the chemicals used in or produced by the processes that are known to have occurred at the location where the work will be performed. Once the chemicals have been identified, all of the available information for these chemicals (e.g., Material Safety Data Sheets exposure limits) will be collected and presented in the health and safety plan.

Physical hazards are those resulting from the physical condition of the area where the work will be conducted. Most of the buildings in the South Plants Area are in poor condition and present slip, trip, and fall hazards. Other physical hazards

include noise, heat and cold stress, manual lifting, elevated work areas, protruding nails, and loose boards.

After the physical hazards have been identified, each work task will be examined to identify unique hazards. Identifying these hazards before work begins helps to prevent accidents while the work is being performed.

Efforts will be made to reduce or eliminate personnel exposure to these hazards. Hazards that cannot be eliminated must be guarded against by using engineering controls or PPE. A hazard communication program will be implemented in compliance with federal and state regulations. Every effort will be made to inform and train all employees regarding hazards and protection requirements that are associated with exposure to or handling of hazardous wastes.

8.3 SITE WORKER TRAINING

To be qualified to work at RMA, a worker must be trained in accordance with OSHA 29 CFR 1910.120, Hazardous Waste Operations and Emergency Response (HAZWOPER). Individuals designated as Site Manager and Site Health and Safety Coordinator must have an additional eight hours of supervisors' training.

Before beginning activities that may increase a worker's exposure risk, site workers will be given site-specific training relevant to the potential hazards associated with their assigned duties and responsibilities. Additionally, a daily site-safety meeting will be held before daily field activities begin.

Emergency routes from the site to the primary hospital and alternate emergency hospitals are discussed and illustrated as part of the training requirements and will be detailed in the Health and Safety Plan.

8.4 PERSONNEL PROTECTION

The purpose of PPE is to reduce or eliminate the chemical and physical hazards that may be encountered during field activities at the site. Personnel must wear PPE in the following situations:

- field activities involving known or suspected atmospheric contamination;
- vapors, gases, particulates, or splashes may be generated by site activities; or
- direct contact with skin may occur.

The specific levels of protection have been divided into the following three categories according to the degree of protection anticipated for use at the site:

- Level B will be worn when a high level of respiratory protection and a moderate level of skin protection are necessary.

- Level C will be worn when airborne concentrations dictate and a low level of skin protection is necessary.

- Level D will be worn in areas of the site that do not present respiratory or skin hazards.

In situations where the type of chemical, concentrations, and possibilities of contact are unknown, the appropriate level of protection must be selected based on the professional experience and judgment of the Certified Industrial Hygienist and input from PMRMA Health and Safety representatives. Levels of PPE will be addressed in the Health and Safety Plan.

8.5 MEDICAL SURVEILLANCE REQUIREMENTS

Medical monitoring programs assess the physical condition of employees on a regular basis, as well as assess and document preemployment of baseline conditions before potential occupational exposures. A medical program in accordance with 29 CFR 1910.120(f)(2) will be instituted for the following workers:

- all workers who may be exposed to hazardous substances or health hazards above permissible exposure levels (PELs) for 30 days or more a year;

- all workers who wear a respirator for 30 days or more a year; and

- all workers who are exposed or injured as a result of activities involving hazardous substances.

For each person involved with the project, copies of pertinent records will be maintained onsite by the contractor's site health and safety coordinator. The details of the monitoring program will be contained in the Health and Safety Plan.

8.6 AIR MONITORING REQUIREMENTS

A personal air monitoring plan will be developed to identify and quantify airborne levels of hazardous substances and other health hazards to make certain that site workers will not be exposed to harmful levels of airborne toxic chemicals in either vapor or particulate form. Personal air monitoring results will be used to determine the level of protection workers will wear. Types of air monitoring and sampling, air monitoring requirements, and actions levels will be presented in the Health and Safety Plan.

8.7 SITE CONTROL

The primary purpose of site control is to establish the hazardous area boundaries to reduce migration of contaminants into clean areas, and to prevent access or exposure to hazardous materials by unauthorized personnel. RMA site control is enforced with a perimeter fence and security guards staffing the west and south gates. For the fieldwork site, a three-zone approach will be used. The three zones are designated as an exclusion zone, a contamination reduction zone, and a support zone.

Methods and procedures for maintaining site control involving the RMA security and protection zones will be further defined in the Health and Safety Plan.

8.8 DECONTAMINATION PROCEDURES

Decontamination procedures will be conducted during the removal actions. Personnel and handheld equipment will undergo gross decontamination with wash

and rinse solutions in basins located in the contamination reduction zone. Decontamination will be closely monitored so that contamination is not spread into clean areas.

All used PPE and clothing will be contained, stored, and disposed of in accordance with procedures outlined by RMA management personnel. Personnel and handheld equipment decontamination procedures will be addressed in detail in the Health and Safety Plan. The decontamination of the piping and equipment that is removed is discussed in Section 5.0.

8.9 CONFINED SPACE ENTRY PROCEDURES

Confined space entry requirements must be used when personnel enter a subgrade space such as a valve pit, a tank, or any other space defined as a confined space. When a confined space activity occurs, the possibility exists that a reduced oxygen level, combustible gas, or toxic vapors may be present. Special precautions will be implemented to protect the personnel from potential hazards. These precautions will be detailed in the Health and Safety Plan along with notification and permit procedures. Confined space entries will be performed in compliance with 29 CFR 1910.146.

8.10 EMERGENCY RESPONSE PLAN

Personnel must be prepared for emergencies such as illness or injury, chemical exposure, fires, spills, releases of harmful contaminants, or adverse weather conditions. Information on appropriate emergency procedures will be made

available to all personnel before starting work and at the work site. Procedures and emergency contacts will be addressed in detail in the Health and Safety Plan.

8.11 COORDINATION WITH OTHER ACTIVITIES

To avoid schedule conflicts with other contractors in the South Plants Area, coordination with other tasks is essential. Coordination with other activities is instituted before work activities begin to identify and resolve potential conflicts. Weekly contractor meetings are held on Tuesday mornings to address any issues that are relevant for the coming week. A meeting each morning provides daily activity updates. A designated individual will attend each of these functions.

9.0 EMERGENCY SPILL RESPONSE AND CONTINGENCY PLANNING

An Emergency Spill Response and Contingency Plan (ESRCP) is necessary whenever decontamination and removal actions are being performed. The ESRCP is designed to minimize hazards to human health and the environment from any unplanned release of hazardous substances or oil to the air, soil, or surface water and groundwater. The plan establishes responsibilities, duties, procedures, and resources to be used to contain and mitigate releases of oil or other hazardous substances at RMA. The removal contractor will prepare supplements to the PMRMA guidance on ESRCP before work begins.

This plan specifies procedures to be followed when responding to releases, accidents, and spills involving oil or hazardous substances. These procedures include spill detection, reporting, containment, cleanup, and disposal procedures. This document also includes general procedures for plan reviews and updates, training, and record keeping. PMRMA, whose mission since 1987 has been to provide support to the ongoing remedial cleanup operations at RMA, will review this plan. The plan will be implemented with the PMRMA Contingency Plan, Volume I (DOE 1991). The full plan will be available onsite during all field activities.

The ESRCP will be organized to follow the sequence of events as they might happen in an emergency situation. Detailed sections on the following topics will be included in the ESRCP and are discussed in the following sections:

- Incident Discovery and Immediate Reporting;
- Incident Response Procedures;
- Emergency Response Team Activation;

- Responsibilities of the Emergency Response Team;
- Training Requirements;
- Contingency Planning;
- Evacuation Planning; and
- Required Written Reports.

9.1 INCIDENT DISCOVERY AND IMMEDIATE REPORTING

The following incidents must be reported immediately to the COR, PMRMA's Fire Protection and Prevention Branch, and the selected emergency response team:

- chemical spill or accident;
- petroleum spill or accident;
- discovery of ordnance or chemical agents;
- fire or explosion;
- tornado sighting;
- lightning strike;
- airplane crash; or
- other event that could present a hazard to human health or the environment.

Details on incident discovery and reporting procedures, including a listing of reportable quantities, will be presented in the ESRCP.

9.2 INCIDENT RESPONSE PROCEDURES

Development of emergency response procedures is necessary to minimize the impact of these events on the environment and to protect human health. Detailed

procedures that are consistent with established PMRMA emergency spill response actions will be developed. Spill response procedures for incidents involving oils, acids, bases, flammable or combustible organic liquids, pesticides, chlorine, PCBs, and mercury will be developed. Each emergency procedure must discuss probable migration pathways, PPE and worker protection, fire control, containment, neutralization, container compatibility, container labeling, and emergency first aid procedures.

9.3 EMERGENCY RESPONSE TEAM ACTIVATION

Some incidents at RMA will require emergency response team (provided by contractor) activation. All response activities involving a spill or release of a hazardous substance will conform to the protocols established by the RMA Contingency Plan (DOE 1991) as well as the protocols stated in this plan. Because of the speed with which spilled materials can migrate, timely response is critical to minimize risk and cleanup costs. Therefore, each team involved with intrusive tasks will include workers who are properly trained in the recognition, prevention, and procedures of handling emergency incidents, as required by 29 CFR 1910.120. Additionally, each team will be provided with a spill kit to aid immediate containment of any spilled material.

Some incidents at RMA will require activation of the RMA Installation Response Team (IRT). For complete details on activation of the IRT and RMA Emergency Control Center, refer to the Installation Spill Contingency Plan. The complete plan will be kept onsite during all intrusive activities.

9.4 RESPONSIBILITIES OF THE EMERGENCY RESPONSE TEAM

The emergency response team will include the following members:

- response coordinator;
- response manager;
- chemist;
- site health and safety coordinator;
- foreman; and
- remedial technicians.

The responsibilities of the response coordinator and the individual emergency response team members will be discussed in detail in the ESRCP. Telephone and 24-hour emergency pager numbers for each team member will be listed in the ESRCP.

9.5 TRAINING REQUIREMENTS

Specific training requirements for onsite contractor teams, visitors, or government representatives will be divided into the following training categories:

- regular site workers exposed to hazardous substances;
- management and supervisory training personnel;
- refresher training personnel; and
- restricted access (support zone) visitors.

9.5.1 Regular Site Workers Exposed to Hazardous Substances

Site workers (contractors) whose job responsibilities expose, or have the potential to expose, them to hazardous substances or health hazards are required to comply with 29 CFR 1910.120 (e)(3)(i). This regulation requires site workers who may be exposed to hazardous substances to complete a minimum of 40 hours of instruction (HAZWOPER training) and three days of supervised field experience under the guidance of a trained supervisor.

9.5.2 Management and Supervisory Training

In accordance with 29 CFR 1910.120 (e)(4), contractor team personnel who manage or supervise workers engaged in hazardous waste operations at the site must receive 40 hours of instruction, three days of supervised field experience under the guidance of a trained supervisor, and have eight hours of supervisory training.

9.5.3 Restricted Access (Support Zone) Visitor Training

Access to the support zone is limited to approved visitors (i.e., government personnel, project management visitors). This group would not require training beyond the minimum requirements for entry to RMA, but they would be required to undergo a brief orientation regarding site emergency procedures, hazard awareness, and site boundary control.

9.5.4 Refresher Training

Annual refresher training in accordance with 29 CFR 1910.120 (e)(8) will be completed at least once each year following the completion of the individual's initial training course. The annual refresher training will be required of all contractor team personnel to maintain their qualification for hazardous waste site operation.

All training must be properly documented and filed onsite for reference by the site health and safety officer or designated representative. The site health and safety officer, or designated representative, will periodically review the documentation and prohibit work access to any individual who does not possess the necessary qualifications.

9.5.5 First Aid and Cardiopulmonary Resuscitation

The site health and safety officer will have and maintain current certification in first aid, cardiopulmonary resuscitation (CPR), and blood pathogen training by the American Red Cross Association. The site health and safety officer will make certain that at least one individual currently certified in first aid and CPR is onsite during all field activities.

9.5.6 Site-Specific Safety Training

Before beginning activities that may increase a worker's risk of exposure, site workers will be given site-specific training relevant to the potential hazards associated with their assigned duties and responsibilities. Site-specific health and safety training will be conducted for all 29 CFR 1910.120 trained personnel onsite

and will include right-to-know training, OSHA safety training, physical and chemical site hazards, emergency procedures, and specific PMRMA and contractor team requirements. The site health and safety officer, or designated representative, will be responsible for informing individuals performing site activities of the contents of the Health and Safety Plan. The site health and safety officer will also be responsible for making certain that all personnel, visitors, and government representatives present onsite review the Health and Safety Plan.

9.6 CONTINGENCY PLANNING

A comprehensive task-specific contingency plan will be developed. This plan will detail any and all actions used by contractor personnel to prevent the uncontrolled release of oil or other hazardous substance into the environment at RMA. Specific engineering controls and industry-approved work practices that facilitate the prevention of or mitigate the effects of an accidental or uncontrolled release of a hazardous substance will be presented. A complete list of all supplies and materials available for emergency spill response will be included in this plan.

9.7 EVACUATION PLANNING

The evacuation of particular areas at RMA will be determined on a case-by-case basis. The fire chief or fire department officer in charge, with initial response forces, will determine the need for evacuation of an immediate area and, if possible, areas further downwind. Using sirens, bullhorns, and other available signals, and assisted by security forces, the fire chief will evacuate the immediate vicinity of an accident or incident to the extent practical pending arrival of the chemical accident/incident

response officer. Incident area evacuation will be discussed in more detail in the ESRCP.

In the event that a facility-wide evacuation is necessary, the installation on-scene coordinator will authorize the evacuation signal. Immediately following the signal, all persons not participating in the emergency response will evacuate RMA by proceeding to designated locations. Installation-wide evacuation will be detailed in the ESRCP.

9.8 REQUIRED WRITTEN REPORTS

The contractor will supply PMRMA with a written Accident/Incident Report within 24 hours of any release of oil or hazardous substances. If the incident involves a fatality or a minimum of five hospitalizations, the report will be supplied within three hours. All incident reports must include the following information:

- name, address, and telephone number of the contractor;
- date, time, and type of incident;
- name and quantity of the material(s) involved;
- extent of injuries, if any;
- actions taken during the incident response;
- assessment of actual or potential hazards to human health or the environment;

- cause of the incident; and

- description of the corrective action taken to prevent the recurrence of the incident.

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10.0 INTEGRATED PLANNING

To efficiently execute the removal and decontamination activities described in this document, work element components will need to be coordinated with other ongoing IRA programs and CPRA IRA work elements. This section presents the integrated planning and coordination concepts necessary to successfully incorporate this work with the other CPRA IRA work elements and IRA programs. Other activities associated with treatability studies and facilities operations are ongoing in the South Plants Area and are also identified. This integrated planning presents different ways to divide the work presented in this document depending on other IRA programs, CPRA work elements, and administrative requirements.

As stated in Section 1.0, the CPRA IRA comprises three ongoing IRA programs and five work elements that are being conducted in the South Plants Area. The information provided in this section is intended to guide the demolition contractors to a point of resolution for issues that may arise during the planning or demolition work. This approach should assist in communicating the scope of the other IRA programs and CPRA IRA work elements and assist in establishing points of contact who may be able to resolve possible problems.

Section 10.1 summarizes other ongoing IRA programs and the CPRA IRA work elements in the South Plants Area. Section 10.2 breaks the work into zones of varying sizes and complexity to allow for program and administrative flexibility.

10.1 EXISTING PROGRAM SUMMARY

A brief summary of the ongoing IRA programs and CPRA work elements in the South Plants Area is provided as a basis for effectively coordinating the effort required to complete the scope of the work outlined in this document. This information gives a brief snapshot of the work currently being performed in the South Plants Area. The following sections describe the various IRA programs for (1) PCB identification and removal; (2) friable asbestos abatement; and (3) piping, equipment, and tank decontamination and removal (CPRA). The IRA program for piping, equipment, and tank decontamination and removal work is further divided into work elements that are also presented. The pilot demolition treatability study is also included as a separate program (not an IRA or CPRA IRA work element).

As stated in Section 1.0, the CPRA IRA comprises three ongoing IRA programs and five elements that are being conducted in the South Plants Area. Demolition activities (planning through demobilization) must be coordinated with several of the PMRMA support services.

The demolition activities include special situations such as disposal of PCB-tagged equipment that will require confirmatory sampling before salvage through DRMO. Appendix D is a policy letter that applies to the requirements for such an activity. Other considerations include coordination with Army Logistics, the use of the CWHA, disposal of decontamination waters through the CWWTF, and coordination of the disposition of Army real property. The deactivation of utility services and the installation of other utility services, use of the logistics warehouse for support equipment, and the coordination of sample analysis are all performed by the removal contractor through PMRMA provided services.

Coordination with the U.S. Fish and Wildlife Service, the PMRMA Safety Health and Environment Office, the PMRMA Fire Department, Security, and the South Plants Coordination Office are on a regularly scheduled basis. The South Plants Area Coordination Policy Letter is included as Appendix F. This policy letter is used by the South Plants Coordination Office to ensure consistency and coordination among the ongoing contractors. These groups should be contacted early in the process and continuing coordination requirements established.

10.1.1 Polychlorinated Biphenyl Remediation Interim Response Action

The remediation program for PCBs was consolidated into a single phase that made the PCB sampling, analysis, decontamination, and disposal the responsibility of a single contractor. The work in general is not limited to agent or nonagent structures, and PCB remediation will be conducted for any equipment, piping, tanks and vessels that may require decontamination before disposal. All PCB disposal is being handled through DRMO, and the requirement exists that all potential PCB containing equipment (Section 3.0) must have sample analysis accompanying the item when disposed of through DRMO. PCB remediation activities are being performed by Weston as contracted to PMRMA. The PMRMA COR is in the Remedial Action Branch A.

10.1.2 Friable Asbestos Interim Response Action

Asbestos abatement activities are ongoing in the South Plants Area. Work is being performed (or is scheduled to be performed) for separate actions east and west of D Street. The ongoing and scheduled work involves asbestos abatement of structures

identified in the South Plants Area as asbestos contaminated (from previous surveys) as well as abatement of piping external to the structures (i.e., steam lines, service lines, product lines, and waste lines). It is anticipated that by close out of the friable asbestos IRA that a total of nine or 10 additional contracts will be awarded.

Extensive coordination is required for friable asbestos IRA work being conducted in the South Plants Area. Some of the asbestos abatement activities are being conducted in structures that contain salvageable equipment and piping. The information provided in the structures tables in the Contamination Assessment (Section 3.0) indicates which buildings may be impacted by the asbestos abatement activities. For the external piping, most of the asbestos abatement activities have been completed and only isolated removal actions remain; however, during preliminary site walks, care should be taken to note the general condition of the external piping. The COR will be in the Remedial Action Branch B for the friable asbestos IRA work being performed; Dominion and McBestos are the two primary asbestos abatement contractors.

10.1.3 Chemical Process-Related Activities Interim Response Action

The chemical process-related activities IRAs includes programs that are at various stages of completion for both agent and nonagent processes. This Consolidated Implementation Document is part of the chemical process-related activities IRA for nonagent activities. The chemical process-related activities are addressed as five ongoing work elements in this section. The nonagent activities include separate work elements for removal of piping, equipment, ASTs, and USTs.

10.1.3.1 Agent-Related Work Element

The CPRA IRA includes actions involving structures, tanks, equipment, and piping in the South Plants Area. The primary agent processes performed in the South Plants Area were the manufacture, storage, and destruction of mustard and lewisite. Manufacturing of GB nerve agent was not performed in the South Plants Area; however, storage and demilitarization operations did occur for more than just lewisite and mustard in the area.

Some of the piping and equipment used to manufacture and store agent materials may be in structures leased by Shell for their manufacturing operations. Structures identified in the Settlement Agreement (United States and Shell 1988) as Shell actions may actually be part of the Chemical Demilitarization Treaty program and may require removal and disposal by PMRMA. It is currently unclear as to the exact piping and equipment that may be encompassed by this program, and coordination with Shell on this issue is necessary. The government contractor can provide the necessary expertise. The COR will be in the Remedial Action Branch B and will coordinate removal actions with RMA organizations.

10.1.3.2 Nonagent AST Work Element

For the ASTs, the removal actions have been divided into three phases. Each phase addresses a different group of ASTs. The groups were intended to divide the work and allow for parallel removals to be performed by multiple contractors. The removal actions are not divided by geographical areas and in certain instances multiple contractors are working in proximity. Jacobs has been contracted to

perform the Phase I removal, Gonzales is performing the Phase II removal, and Weston is being contracted to perform the Phase III removal. The COR for all three phases will be in the Remedial Action Branch B.

10.1.3.3 Nonagent UST Work Element

For the UST work element three phases have been identified. Each phase addresses a different type of UST. Phase I addresses the removal of State permitted underground petroleum storage tanks. Phase II is for the removal of nonpermitted underground petroleum storage tanks, and Phase III is the removal of underground chemical and waste storage tanks (nonagent). The COR for all phases of the UST work element will be in the Remedial Action Branch A. Some of the USTs may be integral parts of the Shell processes and may contain some Shell materials. It is unclear whether any of the USTs are part of the Shell actions identified in the Settlement Agreement. There are Shell Tank Farms that contain USTs. For example, Tank Farm 105 has a UST, this tank farm was installed, and used by Shell as part of the DET system. There may be other tanks identified in this program that are also of unknown origin that may require coordination with Shell to resolve responsibility and removal issues.

10.1.3.4 Nonagent Piping and Equipment Removal (Phase I) Work Element

Equipment and piping removal has begun for Buildings 321, 325, 365, and 741 in the South Plants Area. This action is being performed by EBASCO and the PMRMA COR will be in the Remedial Action Branch B. The work includes asbestos abatement for Buildings 321 and 325 as well as some limited PCB removal actions.

The decontamination and demolition work of the equipment and piping is the final action for the Phase I work element of the CPRA IRA.

10.1.3.5 Nonagent Nonprocess External Piping Work Element

The nonprocess external piping (utility services) is also being decontaminated, dismantled, and disposed of as part of the nonagent chemical process-related activities IRA work element. The planning phase is currently being conducted and the work is expected to begin before 1995. Gonzales is the demolition contractor assigned to the work and the PMRMA COR will be in the Remedial Action Branch B. The scope of the work includes some 20 to 30 miles of steam, water, condensate return, and air lines. These utility service lines are somewhat independently located from the process pipe and piping systems.

10.1.4 Pilot Demolition Treatability Study

Evaluation of demolition techniques on various structures located in the South Plants Area is being performed as part of a treatability study for the Structures Feasibility Study. The demolition of the identified structures will then provide information on the most effective methods to employ on the remaining no future use structures at RMA. These structures are Buildings 433, 431, 412, and 317. The evaluation will include a study of the treatment technologies employed and the effectiveness of engineering controls.

Jacobs is the contractor performing document preparation and the removal actions. The COR for this treatability study will be in the Remedial Action Branch A.

10.2 WORK SCOPE

In Section 6.0 the demolition planning and work progression was presented for the various areas. The impact to the programs described in this section can be minimized by evaluating project schedules and knowing the work areas affected. For example, careful scheduling will allow the removal actions in the Northern Tier Production Area to be conducted at a point when no other activities are planned for that area.

Section 11.0 presents a cost estimate for the work to be performed and divides that estimate by work area. Note that the White Phosphorus Area is not included because the work in that area will be performed as part of the agent CPRA-IRA. This breakdown will provide various pieces of work to be contracted by PMRMA as the administrative requirements can be met. The complexity and relative size of each of the work areas in increasing order are as follows:

- Shop Area;
- Production Support Area;
- Chlorine Plant/Brine/Utility Service Area;
- Warehouse Area;
- Southern Tier Production Area; and
- Northern Tier Production Area.

These six areas allow PMRMA to separate the work into as many as six separate contracts or areas may be combined and awarded to a contractor to reduce the separation of the work. The estimated amounts of material in each of these areas is provided in Section 3.0 and the corresponding costs are in Section 11.0.

11.0 COST AND SCHEDULE

The dismantlement and decontamination of the piping, USTs, ASTs, and electrical conduits in the South Plants Area of RMA is estimated to cost $14.2 million. This is based on past decontamination and dismantlement operations. Approximately 6,500 cubic yards of materials would be removed at a cost of $2,200 per cubic yard. The breakdown of the estimated cost is as follows:

Activity	Cost	% of Total
• laboratory analysis	$619,000	4%
• detailed work plan/planning	$1,486,000	10%
• mobilization and demobilization	$1,289,000	9%
• dismantlement and decontamination	$6,193,000	44%
• health and safety, training, and air monitoring	$1,548,000	11%
• site administration and indirect costs	$1,239,000	9%
• contingencies	$1,849,000	13%
	$14,223,000	100%

The following breakdown by characteristic area is described in Section 3.0:

Activity	Cost	% of Total
• Warehouse Area	$1,136,000	8%
• Shop Area	$568,000	4%
• Production Support Area	$710,000	5%
• Northern Tier Production Area	$6,106,000	43%
• Southern Tier Production Area	$2,698,000	19%
• Chlorine Plant/Brine/Utility Service Area	$852,000	6%
	$12,070,000	85%

The total duration of the work element is estimated to be 60 months. At this time, a start date for the work element and the number of contractors to be involved have not been established. A detailed schedule with the breakdown of activities by work area will be provided as part of the Notification Letter and will be enforceable. It is projected that the removal actions may begin as soon as the first quarter (government fiscal year) of 1995. The work is expected to be completed by the year 2000 (depending on the number of contractors and available funding).

12.0 REFERENCES

EBASCO Services Incorporated. 1994a. *Final Implementation Letter Underground Storage Tank Monitoring and Removal.* Version 3.2.

EBASCO Services Incorporated. 1994b. *Detailed Analysis of Alternatives.*

EBASCO Services Incorporated. 1993 (August). *Underground Storage Tank Monitoring and Removal, Task 92-07, Final Assessment/Decision Document.* Version 1.0.

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EBASCO Services Incorporated. 1988. *Contamination Assessment Report Sites 1-3 and 2-18, South Plants Manufacturing Complex, Shell Chemical Company Spill Sites.*

Harding Lawson Associates. 1993. *Waste Management Procedures at Rocky Mountain Arsenal.*

Jacobs Engineering Group Inc. 1994a (February). *Nonagent Nonprocess External Piping Implementation Letter Plan.*

Jacobs Engineering Group Inc. 1994b (January). *Nonagent Process Equipment and Piping Planning Task Implementation Document for Phase I.*

Jacobs Engineering Group Inc. 1994c. *Database for Consolidated Implementation Document.*

Program Manager Rocky Mountain Arsenal (PMRMA). 1993 (October). *Final Implementation Letter, Chemical Process Related Activities, Free Standing Tank Removal, Interim Response Action.*

PMRMA. 1992. *Explanation of Significant Differences for the Chemical Process-Related Activities Interim Response Action Final.*

PMRMA. 1990. *Contamination Assessment Report.*

Roy F. Weston. 1994. *Implementation Letter for Element Two of the CERCLA Hazardous Wastes Interim Response Action at the Rocky Mountain Arsenal.* Version 1.0.

Tennessee Valley Authority. 1993 (May). *Draft Implementation Document for Decontamination and Dismantling of Chemical Process-Related Equipment at the South Plants at Rocky Mountain Arsenal.*

Tennessee Valley Authority. 1991 (September). *Final Decision Document for Chemical Process-Related Activities Interim Response Action at Rocky Mountain Arsenal.*

U.S. Department of Energy. 1991. *Final Contingency Plan for the Rocky Mountain Arsenal, Volumes I-III, Hazardous Waste Remedial Actions Program.*

U.S. Environmental Protection Agency. 1985. *Verification of PCB Spill Cleanup by Sampling and Analysis*.

United States and Shell Oil Company. 1988. *Settlement Agreement Between the United States and Shell Oil Company Concerning the Rocky Mountain Arsenal*. RTIC No. 89068R02.

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APPENDIX A

EXAMPLE NOTIFICATION LETTER

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EXAMPLE NOTIFICATION LETTER

Dear Organizations and State Representative;

In accordance with the procedures established in the Consolidated Implementation Document (CID) for nonagent chemical process related activities IRAs, this Notification Letter is being provided for your information. The schedule presented as part of the cost and schedule section is the enforcable schedule for completion of this portion of the Chemical Process-Related Activities IRA as per the Federal Facilities Agreement. Program Manager for Rocky Mountain Arsenal (PMRMA) recently awarded a contract for the sampling and analysis, clean-up, decontamination, demolition, and disposal of piping, equipment, and tanks associated with the Warehouse Area. The Organizations and State are advised that they have 21 calendar days from the date of this letter until actual site work commences.

Scope of Activities

A site map is included as Attachment 1 to this Notification Letter. The site map identifies the work area.

The scope of work will include decontamination, removal, and disposal of:

- the nine above ground storage tanks identified in Table 3-6 of the Consolidated Implementation Document (CID),
- the equipment located in the eighteen structures in the Warehouse Area summarized in Table 3-7 of the CID, and
- approximately 17,000 linear feet of process piping.

If any of the equipment that is to be removed is tagged as being contaminated with PCB's (yellow tag), Roy F. Weston Inc. will be contacted. Weston will be responsible for the removal and disposition of the PCB contaminated equipment. If any of the equipment has a blue tag which indicates the equipment was found to be noncontaminated or contaminated below the TSCA action level, Weston will be contacted to arrange for certification regarding the degree of PCB contamination. The certification must accompany the turn-in documents to the Defense Reutilization and Marketing Office (DRMO).

Of the identified 17,000 linear feet of process piping approximately 1,500 feet is targeted for characterization sampling. This includes 1,000 feet of process piping identified as sniff, and 500 feet of piping used for unknowns. Sampling of these process pipes will follow the procedures for residues or discolored pipe interiors as outlined in Section 4.0 of the CID.

The majority of the items will be decontaminated using an on-site temporary decontamination pad. Procedures will be implemented to maximize the amount of material that may be turned into DRMO to be recycled. The most recent estimate indicates that as much as 90 percent of the material may be recyclable. Material that is not turned in for recycle will be disposed of following the current waste management policies.

The Army will be provide a Completion Letter to the Organizations and State upon close out of the contractual work for this area. Any peculiar circumstances that resulted from these activities will be identified along with the final contractual completion date.

Special Requirements

As was identified in the scope of activities some of the process piping is of an unknown or unidentified use. Since most of the removal actions associated with the Warehouse Area are for identified nonhazardous processes special health and safety considerations were developed to protect worker health and safety for these actions. These actions include the use of personal protective equipment and clothing (PPE&C), air monitoring, and personnel air sampling for these activities. Most of the remainder of the work is expected to be performed in modified level D PPE&C with no specific air monitoring requirements.

Cost and Schedule

Field activities are expected to commence on September 1, 1995, and continue through December 1, 1995. The scheduled completion date for this area of the work is March 1996. Please refer to Attachment 2 for the detailed schedule of work activities.

If you have any questions or require additional information on this response actions, please contact Mr. Roger Smith at (303) 289-0239.

Sincerely,

Charles T. Scharmann
RMA Committee Chairman

APPENDIX B

INDICATOR RANGES FOR METALS

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INDICATOR RANGES FOR METALS

The indicator ranges reflect the concentrations expected to occur naturally in RMA alluvial soils.

Metal	Indicator Range (ppm)
Cadmium	1.0 - 2.0
Chromium	25 - 40
Copper	20 - 35
Lead	25 - 40
Zinc	60 - 80
Arsenic	DL - 10
Mercury	DL - 0.10

Notes:

DL = detection limit

Source:

EBASCO Services Inc., 1988. *Phase I Contamination Assessment Report Sites 1-13 and 2-18, South Plants Manufacturing Complex, Shell Chemical Company Spill Sites.*

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APPENDIX C

LETTER FROM QUALITY ASSURANCE BRANCH REGARDING REJECTED SAMPLE RESULTS

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DEPARTMENT OF THE ARMY
PROGRAM MANAGER FOR ROCKY MOUNTAIN ARSENAL
COMMERCE CITY, COLORADO 80022-1748

July 5, 1994

REPLY TO
ATTENTION OF:

Quality Assurance Branch

Mr. Richard Curtin
ARDL Incorporated
P.O. Box 1566
Mt. Vernon, Illinois 62864

Dear Mr. Curtin:

The two data packages for lots AEO and AEP (fluoroacetic acid in water) submitted by ARDL have been reviewed. The following comments apply to both lots.

a. Fluoroacetic acid was reported in every sample analyzed.

b. No method blanks were prepared and analyzed with the samples reported in these lots.

c. ARDL applied inorganic quality control acceptance criteria instead of EPA SW-846 quality control protocols, which are more appropriate for analysis of an organic compound in a waste matrix. Had EPA Method 8000 criteria been applied, the initial calibration would have failed, in addition to half of the continuing calibration analyses.

d. Matrix spikes were prepared with additions of FC2A too small to be detected in the presence of the reported high concentrations of target analyte.

e. No laboratory control samples (standard matrix spikes) were analyzed with these samples.

f. One of the three sets of duplicates analyzed failed to meet laboratory acceptance limits for precision.

g. No confirmation technique was employed. The samples should have been spiked with appropriate amounts of target analyte and reanalyzed to verify the presence of a single peak at the same retention time as that identified in the unspiked samples.

Due to the lack of any demonstrable laboratory control as evidenced by the above findings, the results for lots AEO and AEP are rejected.

If you have any questions regarding this review, please contact the undersigned, AMCPM-RML-Q, 289-0525.

Sincerely,

Douglas L. Stevenson

Douglas L. Stevenson
Contracting Officer's
Representative

Copies Furnished:

Dr. Jack C. Pantleo, D.P. Associates, Inc., P.O. Box 177, Commerce City, Colorado 80037-0177
Alan Alai, Jacobs Engineering Group, Inc., 600 17th Street, Suite 1100N, Denver, Colorado 80202

APPENDIX D

PCB POLICY LETTER

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AMCPM-RME-A (200-1c)

18 JULY 1994

MEMORANDUM FOR SEE DISTRIBUTION

SUBJECT: Identification and Marking of PCB Contaminated Equipment

1. Roy F. Weston, Inc. has been tasked to survey all equipment on the Arsenal for potential PCB contamination.

2. If a piece of equipment is found to have PCB contamination above the TSCA action level, a yellow PCB tag will be placed on that equipment to indicate it is contaminated with PCB's.

3. Yellow tagged equipment should not be moved before contacting Weston at 289-3188. Once moved, the equipment has to be placed into a TSCA compliant storage area.

4. If a piece of equipment is found to be non-contaminated with PCB's or contaminated below the TSCA action level, a blue tag will be placed on that equipment.

5. Weston must be notified at least two weeks in advance at 289-3188 or 980-6800 (Janet Marks) if any blue tag equipment is scheduled for removal from the Arsenal through Defense Redistribution and Marketing Office (DRMO).

6. Any blue tagged equipment that is sent to DRMO for resale or disposal must have certification regarding the degree of PCB contamination. Certification must accompany turn-in documents to the Logistics Branch.

7. The point of contact for this action is Howard Ribaud at ext. 5273.

EUGENE H. BISHOP
Colonel, CM
Program Manager

DISTRIBUTION:
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APPENDIX E

CERCLA WASTEWATER TREATMENT FACILITY ACCEPTANCE CRITERIA

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DEPARTMENT OF THE ARMY
PROGRAM MANAGER FOR ROCKY MOUNTAIN ARSENAL
COMMERCE CITY, COLORADO 80022-2180

February 22, 1993

REPLY TO
ATTENTION OF:
Interim Response Branch

SUBJECT: Contract Number DAAA05-92-D-0004, Task 92-13, CERCLA Waste Water Treatment Plant (WWTP) Operation and Management

Mr. Bruce Jones
Jacobs Engineering Group, Inc.
600 Seventeenth Street
Suite 1100 N
Denver, Colorado 80202

Dear Mr. Jones:

Enclosed please find the subject memorandum, which outlines the hours of operation and acceptance criteria for the CERCLA WWTP. This information shall be taken into consideration in planning field activities for Task 13 and in determining decontamination strategies in the implementation document for non-agent process equipment and piping decontamination and removal. Jacobs Engineering shall ensure that waste water submitted for treatment at the CERCLA WWTP under this task shall conform with the requirements outlined in the memorandum.

Please disseminate this memorandum to your waste management and field personnel. It may be helpful to include copies of this memorandum in job manuals and waste management plans for convenient reference.

Please do not hesitate to contact me at (303) 289-0239 if you have any questions.

Sincerely,

Mary Ann Rondinella

MARY ANN RONDINELLA
Contracting Officer's
Representative

Enclosure

CF (w/o encl):
AMXRM-DOC (Terry Grush)
AMXRM-EIR (Bruce Huenefeld)
AMXRM-TED (Pat Silva)

AMXRM-TOM (200)

18 February 1993

MEMORANDUM FOR See Distribution

SUBJECT: CERCLA Waste Water Treatment Plant (WWTP) Operation and Management

1. The Remedial Operations Branch will assume responsibility from Shell Chemical Company of the CERCLA WWTP effective 1 March 1993.

2. Waste water treatment acceptance criteria is enclosed.

3. Hours of operation for the CERCLA WWTP are 0700 hours until 1500 hours, Monday through Friday, five days a week, except closed on Federal holidays.

4. Emergency hours of operation other than those stated in No. 3 above may be obtained with sufficient advance notice.

5. POC is Gene Crabtree at extension 289-0274/5274.

S. G. Crabtree

Encl

S. G. CRABTREE
Plant Engineer
CERCLA WWTP

DISTRIBUTION: B

CERCLA WWTP
WASTEWATER ACCEPTANCE
& TREATMENT POLICY

Based on process design criteria The Cercla WWTP will accept waste water for treatment if it meets the requirements shown in Table 1.

TABLE 1.

A. Contains heavy metals in less than the following concentrations:

METAL	CONCENTRATION(ug/l)
Cadmium	10
Chromium	50
Copper	200
Lead	50
Mercury	2
Zinc	2,000

B. Contains organic contaminants in less than the following concentrations:

ORGANIC CONTAMINANT	CONCENTRATION(UG/L)
Total Volatiles	200,000
Total Semi-volatiles	40,000
Benzene	100,000
Chloroform	10,000
Methylene Chloride	500
Methylisobutyl Ketone	35,000

C. Contains inorganic contaminants in less than the following concentrations:

INORGANIC CONTAMINANT	CONCENTRATION (ug/l)
Arsenic	5,000
Fluoride	100,000
Chloride	250,000 for Volumes >60,000 gal.
	500,000 for Volumes <60,000 gal.

D. Does not contain light or dense non-agueous phase liquids(NAPL).

E. Does not contain suspended solids in excess of 1000 mg/l.

F. Does not contain oil and/or grease in excess of 500 mg/l.

G. Is not classified as sludges and/or solid wastes.

H. All wastewater to be treated must be accompanied by chemical analyisis and concentration.

I. Wastewater awaiting chemical analysis will not be accepted.

The above criteria are established as operating guidelines for the Cercla WWTP. Wastewaters that do not satisfy the criteria will be given special consideration and will be handled on a case by case basis after discussion with the Plant Engr,-Gene Crabtree,Bldg.111 ph. 289-0274 or Cercla Plant ph. 289-0247.

APPENDIX F

SOUTH PLANTS AREA COORDINATION POLICY LETTER

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DEPARTMENT OF THE ARMY
PROGRAM MANAGER FOR ROCKY MOUNTAIN ARSENAL
COMMERCE CITY, COLORADO 80022-1748

REPLY TO ATTENTION OF:
AMCPM-RME-A (25-50)

PM-S-11
27 June 1994

MEMORANDUM FOR SEE DISTRIBUTION

SUBJECT: South Plants Area Coordination

1. Purpose: The purpose of this policy memorandum is to improve safety, coordination, and control of access to the South Plants area at Rocky Mountain Arsenal. The policies in this letter apply to all organizations and individuals working in or visiting the South Plants. The South Plants includes the entire built-up area north of the lakes in Sections 1 and 2, excluding the former hydrazine facility and Transformer Station 316. It also includes the portions of tank farm 105 (part of the Denver Effluent Treatment system) located north of December 7th Avenue. South Plants maps are at Enclosures 1 and 2.

2. Sign In -- Sign Out Policy: All persons, inspectors, teams or crews working in or visiting the South Plants will sign in and sign out daily at the South Plants Access Control Point. It is located east of "D" street east of Building 314 in a shed next to a double wide trailer. The location is also shown on the map at enclosure 1 and information signs are posted. Duty hours for the access control point are Monday through Friday 0630 to 1630. Nonemergency access during non duty hours must be coordinated with the access control point during the week preceding the access. In the event of an emergency (e.g., fire, incident, etc.), emergency response personnel (e.g., RMA Fire Department, Police Officers, response teams, etc.) are exempt from this requirement. Other non-duty hours (unpreplanned) access must be coordinated with the RMA Law Enforcement Branch, telephone 289-0320. Through rail traffic and road traffic on December 7th Avenue, "D" street, or the west perimeter road is exempt from signing in or out. However, rail traffic must be coordinated the previous work day. Access for tours must also be coordinated the previous work day.

3. South Plants Access Permits:

a. Application: A South Plants Access Permit (PMRMA Form 1800-T at enclosure 3) must be submitted (in duplicate) for each project by all organizations (both government and contractor) establishing work zones for sampling, well drilling, remediation,

This Program Manager Policy Memo supersedes all previous Command Policy Letters and Program Manager's Guidance on this subject.

demolition, utility, construction or other activities with a duration of one day or longer at a single site or to close a road for more than 30 minutes. Both initial and renewal access permit applications should be turned in no later than the Tuesday morning contractor's meeting the week before they take effect. They may be turned in at the Tuesday morning contractor's meeting, the South Plants Access Control Point, or the Environmental Engineering Division Office (A box marked "South Plants Area Coordinator IN" in room 250 in building 111). A map showing work location, road closures and exclusion zone boundaries will accompany the permit application (Dark or red ink should be used so that the information will be retained on copies -- fiber point pens are ideal for making thick distinct lines). Three dates will be entered on the permit application -- the effective from and to dates of the permit and the date that work in the designated work areas should be completed (the "End" date). Approved permits will be valid for a maximum duration of 14 days (Monday through Sunday, 14 days). One permit may cover several active work sites if the same person is responsible for all and is physically on site in the South Plants.

b. Review and Approval: The South Plants Area Coordinator (SPAC) will review Access Permit applications. Applications with no apparent conflict with other activities will be approved within one working day of application. The SPAC will sign both original copies of approved applications in green ink and return one original to the applicant. Applicants may pick up their approved original at the South Plants Access Control point.

c. Conflicts: The SPAC will not approve an application if there is an apparent conflict between proposed activities. In such cases, the SPAC will request the organizations concerned to meet with each other within one week to resolve the apparent conflict and to involve their respective Contracting Officer's Representative (COR) if necessary. Consideration should be given to priorities when resolving conflicts. Emergency response (e.g. fire, incident, emergency utility repair, etc.) has priority over all projects. Chemical Weapons Treaty On-Site inspections, actions with enforceable deadlines and actions in progress would normally follow in that order of priority. Other considerations may include avoidance of extra mobilization or demobilization costs, work necessary to precede other required work, weather and other factors. When the organizations or contractors, CORs and PMRMA representatives fail to resolve a conflict, both sides will inform the SPAC of their position and the reasons that they cannot reach resolution. The SPAC will then refer the issue to management for resolution. Alternatively, the SPAC may note on an application that coordination with another activity is

necessary and sign it indicating conditional approval.

d. Distribution of Access Permits: The SPAC will retain one copy of each of access permit application received and forward one copy to the PMRMA project officer or Contracting Officer's Representative. The SPAC will also forward the duplicate original of approved access permits to the U.S. Fish and Wildlife Service and provide one copy each to the asbestos and remediation field inspectors.

e. Coordination Meeting: Normally, coordination of South Plants activities will occur during or immediately after the Contractor's meeting in the Building 111 Briefing Room at 0730 on the Tuesday preceding the week work is scheduled (Note: When Monday or Tuesday is a government holiday, the meeting is held on Wednesday).

f. Peer Review Board: The South Plants Area Coordinator will serve on the peer review board for all projects planned for within the South Plants. The purpose of this participation is to provide early identification of potential conflicts between projects.

4. Work Zone Control Organizations (both government and contractor) doing activities at a specific site(s) in South Plants requiring Personnel Protective Equipment (PPE) will be required to install perimeter barriers before commencing work. Single task short term (duration less than 1/2 day - e.g. monitoring well level measurement) barriers may be traffic cones. Short term barriers (less than one week - e.g. structures sampling) may be engineer tape. Long term barriers (greater than one week) must be orange web fencing (flexible plastic webbing (snow fence) approximately 48" high) around the perimeter of that site. The fencing may be requested from the PMRMA Logistics Branch, Building 618, are PPE and other consumable items. Alternatively, containments, such as for asbestos remediation, may serve as work zone boundaries. This barrier will delineate the work zone boundary for projects. PPE is defined as a hard hat or greater. Two vehicle gates, one for entry and one for exit will normally be provided in the barrier fencing. A personnel gate will be provided and the decontamination line will normally be placed just outside this opening. A copy of the access permit (not the original) will be permanently posted in a clear cover at the personnel gate of the zone.

5. Storm Water Pollution Prevention (SWPP): South Plants has two discharge points for internal (PMRMA) SWPP purposes. All activities in the area must use best management practices to

prevent the pollution of storm water. Waste Management and Spill Contingency Plans will be approved prior to a contractor starting work and must include methods of containment, types of storage containers and storage locations. Liquids will be kept in a bermed secondary containment area. No waste may remain at a work site more than 90 days without specific PMRMA approval. Periodic (normally monthly) inspections are conducted by PMRMA and support personnel to ensure compliance with the PMRMA SWPP Plan. Site superintendents should be prepared to answer questions that inspectors may have concerning their area(s). Inspectors will report deficiencies or problems to the SPAC, who will, in turn, request that the Project Officer or COR resolve them. Problems not corrected within two weeks will be referred to management.

6. Assignment of South Plants Building Space: Organizations may request use of storage or administrative space in the South Plants area to support RMA remediation operations. Both types of space are limited and current remediation plans require the eventual complete razing of South Plants. No sewer service or telephone/telecommunications support is available in South Plants. However, use of existing facilities is preferred if more cost effective than leasing temporary facilities. The application procedure is to complete the PMRMA Form 1801-T at enclosure 4 of this letter. The application must provide the following information: purpose of use (e.g. hazardous materials storage, administrative office, etc.), name of organization (Agency, Division, Branch, Contractor, Subcontractor, etc.) and the name of the responsible person including telephone number and extension and an emergency (non-duty) hour point of contact and telephone number. Concurrence of the South Plants Area Coordinator and the PMRMA Property Administrator and approval of the Realty Specialist is required prior to occupancy of any building. Access permits are not necessary for level "D" or rehearsal operations conducted in these facilities.

7. Site Clearance: Organizations completing work at a specific work site in the South Plants will remove all equipment, trash, refuse, barriers (e.g., tape, fencing, etc.), and waste and store, turn-in or dispose of it in an approved manner.

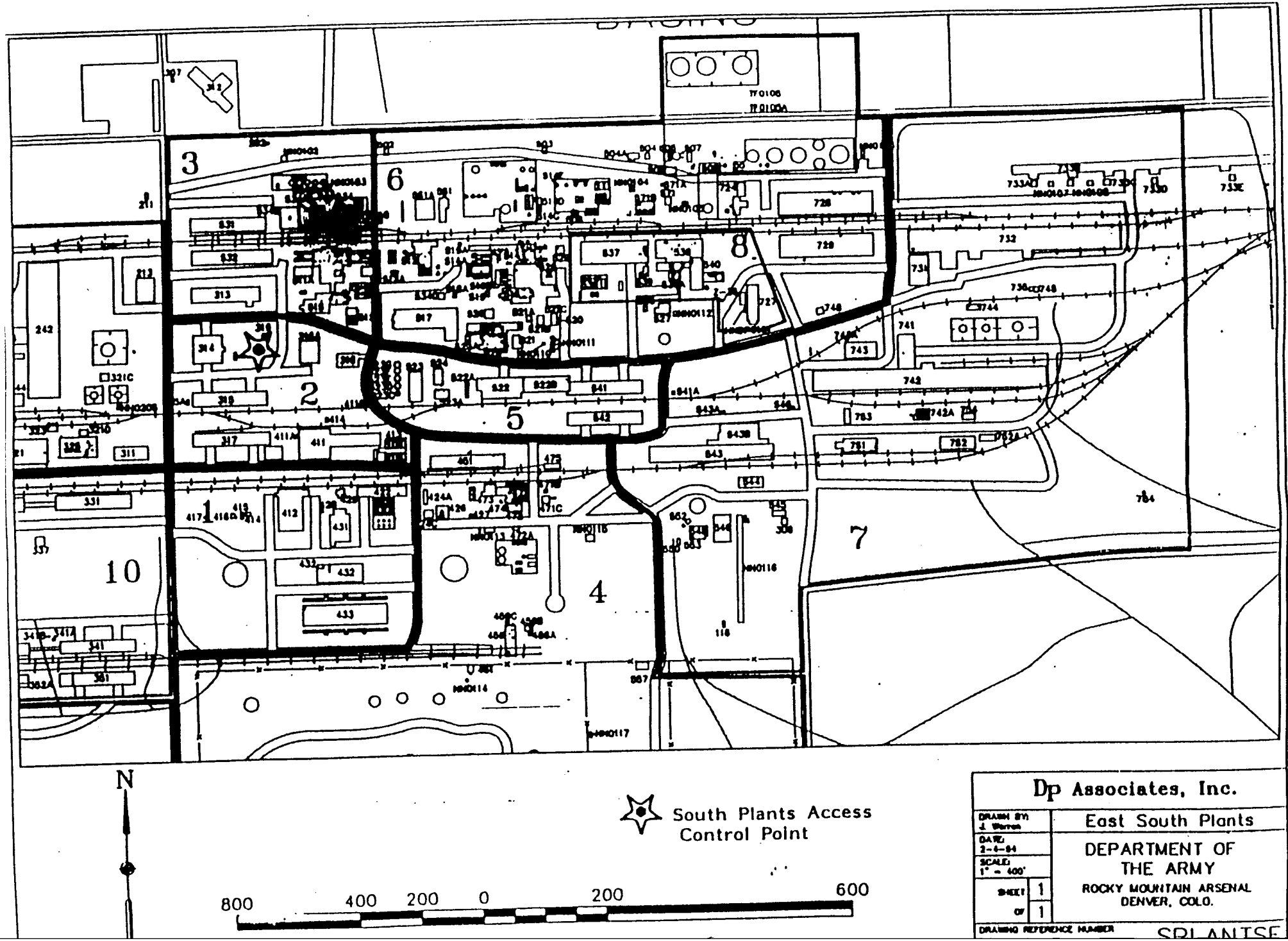
8. Enforcement: Everyone in South Plants must be signed in at the access control point (work crews may be signed in by one person). Persons found in South Plants without having signed in will be asked to leave the area or escorted out, if necessary. Activities found not in compliance with an approved South Plants Access Permit or building space assignment will be asked to come into compliance or may be directed to cease operations.

9. South Plants Area Coordinator: The South Plants Area Coordinator is Mr. John R. Balzer. His telephone number is 289-0102/0239. Mr. Bernard Stockman and Mr. Paxton Willis are the alternates. Their duties are to ensure actions in the South Plants are coordinated in accordance with this policy letter.

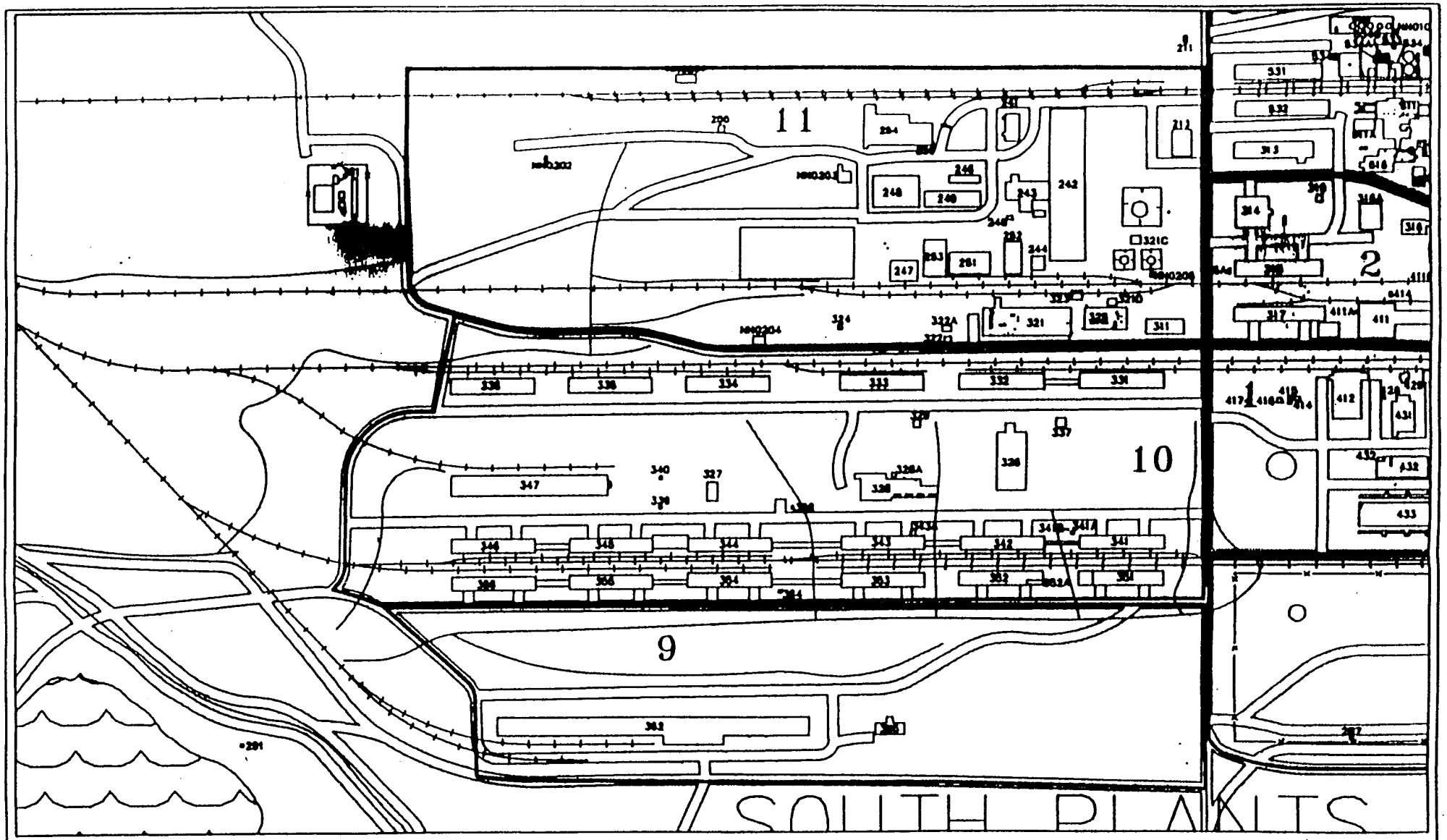
EUGENE H. BISHOP
COL, CM
Program Manager

4 Encls
1. East South Plants Map
2. West South Plants Map
3. PMRMA Form 1800-T, 1 Mar 94
4. PMRMA Form 1801-T, 1 Mar 94

DISTRIBUTION:
B



Dp Associates, Inc.	
DRAWN BY: J. Warren	East South Plants
DATE: 2-4-94	DEPARTMENT OF THE ARMY
SCALE: 1" = 400'	ROCKY MOUNTAIN ARSENAL DENVER, COLO.
SHEET 1 OF 1	
DRAWING REFERENCE NUMBER	SPLANTSE



Dp Associates, Inc.	
DRAWN BY: J. Warren	West South Plants
DATE: 2-6-84	DEPARTMENT OF THE ARMY
SCALE: 1" = 400'	ROCKY MOUNTAIN ARSENAL DENVER, COLO.
SHEET 1 OF 1	
DRAWING REFERENCE NUMBER	SPLANTSW

SOUTH PLANTS
BUILDING USE FORM

BUILDING NUMBER: _____

PURPOSE OF USE: _____

_____

USER: _____

POINT OF CONTACT: _____

_____

PHONE NUMBER: _____ _____
DUTY NON-DUTY

CONCUR: _____
Date SOUTH PLANTS
COORDINATOR

CONCUR: _____
Date PMRMA PROPERTY
ADMINISTRATOR

APPROVED: _____
Date TONY CORDOVA
Realty Specialist

PMRMA FORM 1801-T 1 MAR 94

SOUTH PLANTS ACCESS PERMIT	Number: _____

TYPE: Initial Renewal (previous number: _____)

Part I. Coordination Data

Dates From: _____ **To:** _____ **End Work/Phase:** _____

Company/Agency: _____

POC/Responsible Person: _____

On site telephone: (303) _____ **Fax:** (303) _____

Activity/Project Title: _____

Description of Work: _____

_____

Location Area(s) (Circle Numbers): 1 2 3 4 5 6 7

(Attach map showing work zones in dark ink) 8 9 10 11

Building Number(s): _____

PPE Level (Circle Highest): A B C D

Special Notes (Access Restrictions/ Road Closures): _____

_____

Special Permits Required (Circle): Hot Work Confined Space Entry

Other (specify): _____

_____

Part II. Applicant Data

Contract (if applicable): _____

Delivery/Task Order # (if applicable): _____

PMRMA Project Officer/COR: _____ **telephone:** _____

Applicant Name (printed): _____

Applicant Signature: _____ **date:** _____

Part III. Approval

Approved

_____

South Plants Area Coordinator

Distribution:

Original #1 - Applicant
Original #2 - USFWS

Copies: Asbestos Inspectors,
Remediation Field Inspectors,
Contracting Officer's Representative,
South Plants Area Coordinator

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APPENDIX G

RESPONSES TO OAS COMMENTS ON CONSOLIDATED IMPLEMENTATION DOCUMENT, VERSION 2.1

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APPENDIX G

EPA COMMENTS ON
DRAFT FINAL CHEMICAL PROCESS-RELATED ACTIVITIES NONAGENT PROCESS EQUIPMENT AND PIPING PLANNING TASK CONSOLIDATED IMPLEMENTATION DOCUMENT OCTOBER 1994

GENERAL COMMENT:

1. This IRA implementation letter does not address all of the South Plants nonagent chemical process-related equipment, tanks, piping, etc. as the Army had indicated in previous meetings. EPA had understood that this document would consolidate all interim response action activities in the South Plants regardless of which PRP is responsible for the equipment or which contractor is actually doing the removal.

   Response: *The approach of the Consolidated Implementation Document (CID) was discussed in an OAS meeting on July 21, 1994. Please refer to item 3b of the attached meeting minutes. At this meeting, Shell indicated that they had concerns about the removal of their equipment and piping while debris management issues remained unresolved. It was agreed at this meeting that the removal of Shell equipment and piping would not be included within the CID. The CID however does include an inventory of Shell equipment should debris issues be resolved and Shell wishes to remove their equipment. Information that was presented in previously issued implementation documents was not included in the CID to avoid redundancy.*

SPECIFIC COMMENTS:

1. Page 1-2, second to last bullet. Why doesn't this IRA include all nonagent chemical process-related equipment, tanks, piping, etc. regardless of ownership, responsibility, etc.

   Response: *Please refer to response to General Comment 1.*

2. Page 1-6, first full paragraph. The Final Explanation of Significant Differences listed only possible ARARs and was not complete. Underground storage tank (UST) and PCB regulations were not included. Please include a complete list of ARARs for this document.

   Response: *ARARs for the implementation of the USTs remediation and PCB investigation are addressed in the UST and PCB implementation documents. These documents are referenced in the CID. The UST remediation implementation document was issued as a final in November 1994 and is referenced as EBASCO 1994. The PCB investigation implementation document*

is anticipated to be issued as a final in January 1995 and is currently referenced as WESTON 1994.

3. Page 1-7, last paragraph. Why was the document compared with the Development and Screening of Alternatives and not the Detailed Analysis of Alternatives (DAA). The DAA is the most current of the Feasibility Study documents. Please clarify.

Response: *Comment noted. The Detailed Analysis of Alternatives was not a final document at the time of preparation of this document but has since been utilized. The text has been changed to reflect this.*

4. Page 3-4, third paragraph. When will the databases be included in the comprehensive database, and when will the parties have access to it?

Response: *The databases are complete in their final form and have been provided to DPRA. The parties can request access to this information.*

5. Page 3-7, last paragraph. It is stated that two USTs in the Chlorine Plant/Brine/Utility Service Area have not been previously identified for removal. This appears to conflict with the Final Implementation Letter, *Underground Storage Tank Monitoring and Removal*, August 1994, which states that all USTs are identified. Are these two tanks (0248J, Building 0248 and T0001, Bldg 0251) the only tanks of which the OAS have not been made aware? Table 3-11 of the consolidation document lists six USTs which are not identified in the UST implementation letter. Please clarify the relationship of these two documents and the tanks that are identified in each. It is the EPA's understanding, based on the text provided in the UST implementation letter, that the Phase II tanks were to be part of the Consolidated Implementation Document.

Response: *The Final Implementation Letter (IL), Underground Storage Tank Monitoring and Removal, November 1994, addressed registered and unregistered petroleum, nonregulated compressed propane, and hazardous substance/hazardous waste USTs to be removed from the North Plants, South Plants, and Logistics Area at the Rocky Mountain Arsenal. All USTs covered in the Final Implementation Letter are located outside buildings. The CID covers the removal actions for nonagent chemical process-related USTs in the South Plants Area that were not previously identified in the UST Final IL. Therefore, the two documents are not in conflict since the CID is covering the nonagent chemical process-related USTs that the Final Implementation Letter, Underground Storage Tank Monitoring and Removal did not. The two USTs located in the Chlorine Plants/Brine/Utility Service Area were not previously identified for removal under other programs.*

There is one tank that is covered in both documents. Table 3-15 in the CID includes T0001 associated with Building 0732. Since this tank is already covered in the Final Implementation Letter, it will be removed from the CID.

6. Page 3-13, second paragraph. The document references USTs and a "previous Implementation Document". Which document is the Army referring to? EPA has not received a final implementation letter for USTs.

Response: *The Army is referring to the Final Implementation Letter, Underground Storage Tanks Monitoring and Removal written by EBASCO, dated November 1994, Version 3.2. The USTs referenced are the petroleum USTs covered in the Final IL.*

7. Page 3-14, first and second paragraphs. Why isn't the White Phosphorus Area within the scope of this document? It was EPA's understanding that the consolidation of the South Plants chemical process-related activities was intended to simplify and streamline these activities by eliminating the duplication of effort in the preparation of documents and in coordinating various activities. Consequently, EPA anticipated the receipt of one document which would cover all of the activities in the South Plants. Other than a location of the White Phosphorus Area, there isn't any information presented in this implementation letter. Instead, the Army defers the White Phosphorus Area to TVA, even though the document states, "The removal actions....for this area will be handled as part of the CPRA IRA..."What document details these actions? What does the Army mean by "will likely be included as part of the Memorandum of Agreement (MOA)", and the "majority of the items in the White Phosphorus Area will therefore be removed by TVA." The Army needs to be specific about which actions will be handled under which documents.

Response: *The White Phosphorus Area is excluded because of its relationship to agent chemical-related processes. There are only four heaters in Building 542 in the White Phosphorus Area that are within the scope of this document. Based upon the limited inventory, all items in the White Phosphorus Area will be handled as part of the agent CPRA-IRA. The implementation document that will cover the removal actions is the Final Decision Document for Chemical Process Related Activities, Interim Response Action at Rocky Mountain Arsenal, PMRMA September 1991. The CID text has been rewritten to clarify the inclusion of the White Phosphorus Area as part of agent related removal actions.*

8. Page 3-17, first paragraph. The exclusion of the Shell property likewise compromises the IRA consolidation approach. As the lead PRP and owner of the property, the Army is ultimately responsible for the remediation of the Arsenal. During the July 21, 1994 meeting on the South Plants consolidation, the Army stated that Shell would operate under this consolidated IRA but under a different schedule. Therefore, they should include the Shell-owned/leased properties in this implementation letter. If Shell initiates activities in the South Plants, will another document be issued for these activities? Please clarify.

Response: *Please refer to response to EPA's general comment 1. In the July 21, 1994 meeting with OAS, the scope of the Consolidated Implementation Document was discussed. PMRMA agreed to change the text to clarify that Shell Oil Company remains responsible for the removal of their equipment and piping pursuant to the Settlement Agreement of 1989. Shell has the option of*

following the plans set forth in this Consolidated Implementation Document, developing their own removal plans, or implementing the plans contained in the ROD when it is issued. The text has been rewritten to clarify this issue.

9. Page 3-17, third paragraph. The document states that "it is assumed that the equipment was decontaminated before it was placed in the Army Salvage Yard." Experience at RMA has shown that many areas that are assumed to be decontaminated have not been. How will the Army verify decontamination status?

Response: *The sentence was deleted and replaced with "No historical contamination information is available for this equipment; therefore, the items are assumed to be contaminated unless the status can be otherwise established".*

10. Page 3-24, first full paragraph. The use of the word "considered" in the last sentence in this paragraph implies that these items may or may not be removed under this IRA. If this is true, when will the Army decide the fate of these items? Also, EPA does not support the implementation of an IRA that is totally up to the Army's discretion as to whether or not it should be implemented. The FFA does not allow that type of latitude. Please clarify the Army's intent with regard to this issue.

Response: *The Army's intent in the preperation of the CID is to provide the parties with as complete of an inventory of South Plants equipment, tanks, and piping as possible. In addition, the Army has completed a contamination assessment and outlined the various methods available to demolish the items inventoried. The Army's intention is to develop projects stemming from the CID as funding and scheduling allows. The Army will then provide Notification Letters to the parties once projects have been developed.*

It has been the Army's understanding that this odjective is agreed to in principle by the EPA. This arrangement is a win win situation for both the regulators and the Army becaused visible remediation work is allowed to continue. The EPA's comment that the FFA does not allow for "that type of latitude" may be interpreted differently. The Army views the FFA as allowing this type of latitude if agreed upon by all parties. The Army plans to implement the CID projects as funding becomes available and will continue these projects until they are either completed or the Record of Decision is finalized. The FFA states that once the final response actions are implemented, all IRAs will either end or be incorporated into the final response action. Therefore, the Army's intent is to accomplish all the work necessary to remediate the Arsenal. The only issue is will it be accomplished as part of the IRA or as part of the final response action.

The goal of the CID is to accomplish as much work as possible while generating as little waste as possible. If the Army determines that removing certain pieces of inventoried equipment at this time will generate large quantities of waste, the Army may decide to defer that removal until the final response is decided upon.

The Army has change the word "considered" to "evaluated".

11. Page 3-24, last paragraph. What is meant by "these lines should be removed by TVA." The Army needs to specify which actions will be done and under which document.

Response: *The text has been changed to "A numbers of piperuns are associated with agent facilities and will be sampled." If the analytical results from sampling indicate agent contamination, the piperuns removal will be part of the agent chemical process-related activities IRA. If no agent contamination is found, they will be removed under the plans set forth in this Consolidated Implementation Document.*

12. Page 3-29, second paragraph. It is stated here that 27 USTs remain in the Northern Tier Production area. However, Table 3-25 lists only 14 USTs. Please clarify this discrepancy.

Response: *Table 3-25 is correct in listing 14 USTs in the Northern Tier Production Area. Previously, 27 were listed but 13 were removed since they are agent chemical process-related equipment and cannot be handled under this program. The text will also be edited to reflect this change. Please see Table 1 for clarification.*

13. Page 3-29, second paragraph. The Army states, "Although these (Shell) structures are not within the scope of this document...." How will the Shell buildings be dealt with? Will a document be issued for these activities? Since PCB were not sampled for by Weston, how will PCB contamination in Shell Buildings be addressed? Please clarify.

Response: *Please refer to response to EPA's comment 8. Shell conducted a PCB survey in 1990 and found no PCBs existing in association with any Shell-Only activity. Please refer to Shell's comment 6. The text has been rewritten to indicate Shell found no PCBs.*

14. Page 3-31, Section 3.9. This section lists a total of 39 USTs that are included in the South Plants Consolidated IRA. Please clarify how this number relates to the number of tanks listed in the UST Final Implementation Letter. The Phase II list only identifies 20 USTs. What is the fate of the remaining 19 USTs which are not accounted for between the Phase II list and the Consolidated IRA list?

Response: *Section 3.9 previously listed 39 USTs that are covered in the CID. Of that 39, 27 are located in the Northern Tier Production Area. 13 USTs have since been deleted from the CID because of being agent-related. Therefore, a total of 26 USTs are identified in the Final CID. Of those 26, 14 are in the Northern Tier Area. (Please see response to Comment 12 and Table 1 for clarification.)*

Again, the CID is covering the USTs in the South Plants that the Final Implementation Letter did not. Any comparison between the two documents for

USTs being covered is not valid. The two documents are independent of one another and are intended to be a supplement to each other. (Please see response to EPA's Comment 5.)

15. Page 3-32, first paragraph. What contaminants will be sampled for in the waste oil tanks? Solvents are very often found in waste oil tanks.

Response: *Section 4.0, Sampling and Analysis, discusses sampling and analysis necessary for characterization of the storage tanks, vessels, piping, and equipment. Also, Figure 4-1 provides a Sampling Process Logic Diagram for the characterization activities.*

16. Page 3-33, first paragraph. The Army needs to clarify whether the MOA with TVA is the established contract mechanism and give specific details.

Response: *Please see response to EPA's comment 7.*

17. Tables, Section 3.0 There is no identifiable correlation between the UST Final Implementation Letter and the lists of USTs provided in the Consolidated IRA. Please clarify these differences. The detection limits for some of the compounds that were sampled for are extremely high. In some cases, a concentration is quantified that is less than the detection limit. The detection limits for some compounds are so high, that the Army cannot assume that results less than the detection limit show that the items are not contaminated. Only 21 samples are listed in the tables (16 samples in the pipe runs and 5 samples in the vats). The tables show that the contents of many of the tanks are unknown. Does the Army believe that 21 samples adequately characterizes all of the piping and equipment in the South Plants? Why is a list of Shell equipment listed in the document if the Army does not plan to handle it under this action? Please clarify.

Response: *Please refer to the response for Comment 5 in reference to the statement about the lack of correlation between the UST Final Implementation Letter and the USTs listed in CID.*

In response to comments on the sampling data, the goal of the sampling performed was not to provide waste characterization but to determine the presence or absence of contamination. The samples targeted low spots in unknown or chemical waste lines to provide a worst-case cross-section of contamination in the South Plants. This information was used to develop the decontamination procedures presented in this document. Less accurate analysis techniques were used since the goal was to identify the presence of contamination and not to quantify any contamination. As a result, higher detection limits and estimated concentrations that were below detection limits were reported.

As stated on pg. 3-30, Shell is not required to perform any removal, decontamination, or disposal action pursuant to this work element of the IRA. However, since 39 Shell buildings were already surveyed for this document, the

information was presented since Shell retains the option of performing any actions consistent with this document for the items included in the inventory. Also, please refer to response to EPA's General Comment 1.

18. Page 4-1, second paragraph. This entire paragraph requires clarification. It does not make sense that it would be impossible to categorize a tank if the interior is in good condition. The Army only plans to sample if the interior is corroded or stained. Why must the Army use only historical data and air monitoring for tanks that are in good condition? Just because something looks clean does not mean that it is not contaminated. What about wipe samples? Air monitoring is inadequate for assessing contamination in the tanks.

Response: *The paragraph was rewritten to include decontamination verification after the removal contractor performs decontamination using Best Demonstrated Available Technology (BDAT). If staining, discoloration, pitting, or rusting is still present after BDAT decontamination, and does not meet the land disposal restrictions (LDR) clean debris surface standard, then the material will be decontaminated again using an alternate technology, or will be considered hazardous waste. The use of Best Demonstrated Available Technology for material decontamination, in connection with using LDR clean debris surface standard is consistent with regulatory requirements for determining the hazardous/nonhazardous states of material. The item will be sampled in accordance to the flow diagram shown in Figure 4-1. Wipe sampling is included in this figure as a verification option.*

19. Page 4-3, first paragraph. See comment on page 4-1. How does the Army determine if historical information is sufficient for characterization purposes?

Response: *The Army will use historical information, whenever it exists, as the first criteria for characterization. If no historical information exists, or should air monitoring, visual observation, or other initial field screening technologies not verify historical information, then additional characterization will be necessary.*

20. Page 4-3, second paragraph. The document states that "CLP Level D standards should be used." The Army needs to specify the type of analytical standards that will be used.

Response: *This paragraph has been reworded to specify that EPA Level I and II analytical data quality and quality assurance requirements will be used.*

21. Page 4-4, second paragraph. The document states that "In some cases both hazards categorization and characterization sampling will be performed at a location." Please specify how this will be determined.

Response: *In those cases where hazard categorization is inconclusive, in addition, sampling will be performed to further characterize the tank or pipeline.*

22. Page 5-1, second paragraph. How and when will an "optimum decontamination operation" be determined?

Response: *The optimum decontamination operation will be selected by determining which decontamination procedures provide the most effective means of decontamination for the chemicals present. The optimum decontamination operations will be determined during the preliminary site investigation.*

23. Page 5-2, second paragraph. The document refers to best demonstrated available technologies (BDAT). Is this BDAT under the Debris Rule? Please clarify.

Response: *The BDAT are presented in the Debris Rule Land Disposal Restriction. The intent for decontaminated equipment and materials is not for land disposal but for salvage (reuse or scrap).*

24. Page 5-6, Section 5.2.1.2. This process is recommended as a means of minimizing water volumes, i.e. producing less wastewater requiring treatment. While it is effective in terms of meeting this goal, and is a generally accepted industry practice, it has one major drawback not covered in the document: vaporization of organic and metals. Just as heat addition has been considered as a direct or in-situ treatment of the contaminated soils, to enhance vaporization, the use of heat on residuals in piping or vessels has the same effect. Steam cleaning will increase the fugitive emissions of organic and volatile metals such as mercury. How will potential emissions be dealt with?

Response: *Systems will be implemented to capture residual volatized material if emissions exit above requlatory levels. Personnel performing this task will be monitored for such emissions with personnel monitoring pumps. Past practices at the Arsenal included steam cleaning, and personnel performing the task were in Level C with a respirator containing air purifying cartridges if such emissions were present. The text has been edited to reflect these precautionary measures.*

25. Page 5-10, last bullet. This bullet should state that if the piping cannot be cleaned practicably, it will be disposed of a hazardous debris.

Response: *The bullet was changed to read, "If the piping cannot be decontaminated practicably, it will be disposed of in accordance with Figure 7-1. The generator will make the decisions required per Figure 7-1."*

26. Page 6-1, first paragraph. How will the Shell equipment be dealt with? Will another document be issued? (See specific Comment for Page 3-17, first paragraph.)

Response: *Please see response to EPA's comment 8.*

27. Page 6-3, paragraph. EPA would like to receive a copy of the detailed schedule that is to be used during the implementation of this IRA.

Response: *The detailed project schedules will be included in the Notification Letters. Because of the uncertainty of available funding and other administrative requirements until each specific phase is contracted, it will not be possible to establish milestones. The detailed project schedules will then be enforceable and progress will be measured by the milestones indicated.*

28. Page 6-7, first paragraph. The last two sentences exhibit a rather cavalier attitude implying that even though there was a potential for explosive gases in the lines, torch cutting was permitted and fortunately, no one was injured. If adequate safety precautions were taken, this should be stated with a stronger emphasis on the safety measures taken.

Response: *The Army does not take a cavalier attitude towards safety. Safety practices are stressed to all Army personnel and its contractors. The referenced paragraph has been rewritten to emphasize the need for skilled laborers and a rigorous health and safety program when torch cutting is performed. Hot permits will be obtained from the PMRMA fire department before torch cutting and general requirements for the safe operation of torch cutters will be followed as provided in 29 CFR 1926 Subpart J.*

29. Page 6-12, last paragraph. If the previous contents are so flammable that other demolition techniques may need to be evaluated, then the demolition techniques should be evaluated as part of this implementation document as required in the FFA which specifies that the Implementation Document"....shall include the final drawings and specifications and the final design analysis and cost estimate for implementation..." This information must be provided in this Implementation Document.

Response: *Final drawings and specifications are routinely developed and provided for construction projects. The CID projects will be demolition in nature and therefore no drawings and specifications will be developed. Accordingly, there is no design analysis since no design is being performed. Instead, the Army will write scopes of work detailing what equipment is to be removed under the CID. These SOWs will be written once fundings levels and schedules are formulated. The EPA and CDPHE will be provided project estimates and schedules in the Notification Letter developed for each project.*

The CID has been written to provide the reviewer with a comprehensive understanding of the overall scope of the projected work; a contamination assessment and how the work will be accomplished. This document has been written based upon the extensive field inventories and lessons learned from previous IRA demolition projects.

The paragraph referenced in the comment was rewritten to indicate that the tanks will be inerted using dry ice(CO_2) or nitrogen and the tank seams will be decontaminated before applying demolition techniques.

30. Page 6-13, first paragraph. Please specify how the white phosphorus actions will be handled and under which document.

Response: *As indicated in the previous responses to the White Phosphorus Area removal actions, the material in this area will be handled as part of the agent chemical process-related IRA. Please see response to EPA's comment 7.*

31. Page 7-5, first full paragraph; Page 7-7, first paragraph. Please specify to which contracted RCRA-permitted facility the hazardous waste will be sent. EPA needs to know which facility will be used so that we can verify that the Army is in compliance with the CERCLA Offsite Rule.

Response: *The RCRA permitted Subtitle C facility that will be used to landfill hazardous waste is the Highway 36 facility. If the facility changes, OAS will be notified.*

32. Page 7-17, first paragraph. Accumulation points must meet all of the requirements specified in 40 CFR 262.34.

Response: *Second paragraph of this page states that proper satellite accumulation point management will be achieved by complying with the specified minimum requirements of 40 CFR 262.34 and implementing effective waste management practices.*

33. Page 7-18, second full paragraph. EPA agrees with the Army that any satellite accumulation point must be identified in the RMA Contingency Plan. However, the implementation document should state that the RMA Contingency Plan will be updated to included any new satellite accumulation points before the satellite accumulation points are set up and used to accumulate hazardous wastes. The Army must also submit to the OAS an updated copy of revised Contingency Plan.

Response: *The sentence "The RMA Contingency Plan will be updated to include any new satellite accumulation points before the satellite accumulation points are used to accumulate hazardous waste" was added to the paragraph. A copy of the updated RMA Contingency Plan may be requested by contacting the Safety, Health & Environment office at RMA.*

34. Page 9-5, Section 9.5.2 Supervisory personnel are also required to have 8 hours of supervisory training.

Response: *Comment noted. The text has been corrected to indicate this.*

35. Page 11-1, section 11.0. A schedule for implementation of this IRA must be included as required in the FFA. Anticipated start and completion dates do not constitute an acceptable schedule. A schedule must also include milestones by which progress can be measured.

Response: *Please see response to EPA's comment 27.*

APPENDIX G

SHELL
COMMENTS ON
DRAFT FINAL CHEMICAL PROCESS-RELATED ACTIVITIES
NONAGENT PROCESS EQUIPMENT AND PIPING PLANNING TASK
CONSOLIDATED IMPLEMENTATION DOCUMENT
OCTOBER 1994

GENERAL COMMENTS

1. The concept of breaking this removal effort into small work packages and requiring each contractor to develop the various plans will still require multiple reviews by the Parties. The planning and plan writing for Waste Management, Health and Safety, and Emergency Spill Response and Contingency are much more efficiently and consistently executed by the responsible party and supplied to the contractors. The three areas would be better addressed through plans prepared and reviewed prior to their bid package for the work.

   Response: *RMA is currently evaluating a post-wide Health and Safety Plan, and the potential of developing task-specific SOPs that would be part of the bid packet for the contractor. The RMA Emergency Response Plan is currently available to all contractors and is the focus of the Emergency Spill Response and Contingency Plan. Standardized Waste Management and Data Management plans are currently being developed. It is anticipated that contractors can structure their programs around these plans. These areas will be supplemented by the contractor's specific requirements for the specific work element. These plans, specifications, and operating procedures are not reviewed by the parties because they are contractural requirements and not regulatory documents. Unique and specific elements will be included in the Notification and Completion Letters as appropriate to complete the reporting requirements.*

2. The amount of work involved in removing the piping and equipment that might be defined as a source prior to the ROD is minimal. The activities covered by the consolidated document could best be completed by a single contractor working from procedures supplied by the lead party. Piping and equipment removal should also take into account the potential interfaces with building demolition and all the other potential activities in the South Plants. The overall task of South Plants demolition, as defined in the ROD, should include equipment and piping removal.

   Response: *The removal of piping, equipment, tanks, and conduit before structural demolition will make the post-ROD activities safer and more efficient. The focus of targeting items that can be salvaged, scraped, or recycled increases the cost effectiveness while preparing the site for structural demolition. The overall task of South Plants Area demolition, as defined in the ROD, will include equipment and piping removal for items that are an integral part of the structure. This task focuses on removal of ancillary systems. Coordination with other activities occuring during*

piping and equipment removal are addressed in section 8.11 and 10.0 in the Consolidated Implementation Document.

SPECIFIC COMMENTS

1. Page ES-3, EXECUTIVE SUMMARY The cost estimate seems extremely high even for a rough estimate and even if it includes Shell equipment.

   Response: *The cost estimate does include the removal of Shell equipment and is a maximum expected value that would occur for this program if Shell chose to remove the inventoried items under the plans set forth in the Consolidated Implementation Document.*

2. Page 1-2 and 1-3, INTRODUCTION The second bullet under Consolidation Implementation Document components should not include Shell piping. The last two bulleted items on page 1-3 should be removed since there should be no nonagent Army equipment in Shell structures and the inventory of Shell equipment will be completed by Shell.

   Response: *The second bullet has been changed to indicate the removal of external nonagent process piping. The bullet regarding Army equipment in Shell structures has been deleted from the text. The inventory for 39 Shell buildings was performed previously under this program. The inventory has been included since Shell retains the option of removing items in the inventory under plans set forth in this Consolidated Implementation Document.*

3. Page 1-7, 1.1 PROGRAM BACKGROUND The number of documents that are subject to variations, and therefore to review, remains fairly constant. There could be a greater savings in review time if the Health and Safety, Contingency, and Waste Management plans were written as overall plans with short Task Specific plans written for each task.

   Response: *See General Comment 1.*

4. Page 2-1, 2.0 CONSOLIDATED IRA PROCEDURES There will be no Implementation Document to review for each task but there will be a notification letter and all the associated plans generated by the contractors.

   Response: *Comment noted. Refer to General Comment 1 for review of task plans, specifications, and operating procedures.*

5. Page 2-3, 2.2 NOTIFICATION AND COMPLETION LETTERS There is still a significant amount of information that will be generated by the contractor and the lead party for each activity after the Consolidated Document is reviewed and approved. There should be a review and approval of each notification letter.

   Response: *The Notification Letter is meant as an information source and is not defined in the Federal Facility Agreement (FFA) as a routine part of the IRA*

procedures. The Consolidated Implementation Document is the final defined source of reviewed procedures. If the parties have concerns over the activities identified in the Notification Letter, then more information will be provided, but the Notification Letter is not formally approved.

6. Page 3-30, 3.8 SHELL OIL COMPANY Shell conducted a PCB survey in 1990 and found no PCBs existing in association with any Shell-Only activity. There should be no Army equipment in Shell structures. The inventory of this equipment and all other assessment activities are Shell-Only activities. "The potential for standing liquid is high in the ASTs that remain in the buildings." is not appropriate. The potential for liquid is low in these tanks as they were drained and cleaned in 1982. There will always be a potential for liquids that have accumulated since the system was evacuated which must be planned for in the Health and Safety Plan.

   Response: *The statement on page 3-30, "PCB contamination is not addressed because Weston's scope of work did not include sampling and analysis in the Shell Structures," was deleted and replaced with, "Shell has performed a PCB survey in this area and has not detected any PCBs."*

   The equipment tables and equipment database have been edited to reflect that the inventory of equipment in Shell structures and all other assessment activities are Shell-only structures. The corresponding text in the second paragraph on page 3-30 will also be changed accordingly.

   Comment noted regarding liquid in ASTs. The final sentence in Section 3.8, paragraph 4, was eliminated.

7. Page 4-1, 4.0 SAMPLING AND ANALYSIS "The specific details of the sampling program, including data quality goals, sampling procedures, sample custody procedures, analytical procedures, data management, quality control, and audits," should be developed by the Lead Party not the removal contractor.

   Response: *The Army will ultimately review and approve all removal contractor sampling programs.*

8. Page 4-6, 4.2 HAZARD CATEGORIZING "The specific protocol for hazard categorization sampling" should be prepared by the Lead Party not the removal contractor.

   Response: *The Army will ultimately review and approve all hazard categorization sampling proposed by the removal contractor.*

9. Page 5-4, 5.2 PROCEDURES FOR DECONTAMINATION The liner should be 60 mils not 60 millimeters.

   Response: *The word "millimeters" was changed to "mils."*

10. 8.0 HEALTH AND SAFETY PLANNING A discussion of how the supplied Health and Safety Plan will be utilized by the contractor should be inserted here instead of

the outline of the way the contractor should write the plan. Task Specific plans or addenda may be appropriate with each new work package but these should be very specific and concise.

Response: *Section 8.0 states that the task-specific Health and Safety Plan will consist of supplements to the PMRMA guidance on general RMA health and safety requirements. RMA is currently evaluating a post-wide Health and Safety Plan. Section 8.0 supplies the type of information that will be included in the provided plans and procedures and the intent is to help contractors identify any specific or unique requirements they may have.*

11. 9.0 EMERGENCY SPILL RESPONSE AND CONTINGENCY PLANNING A discussion of how the supplied Emergency Spill Response and Contingency Plan will be utilized by the contractor should be inserted here instead of the outline of the way the contractor should write the plan. Task Specific plans or addenda may be appropriate with each new work package but these should be very specific and concise.

    Response: *See Specific Comment 10.*

12. 11.0 COST AND SCHEDULE The estimated cost seems high even for a rough estimate and even if Shell equipment is included.

    Response: *See Specific Comment 1.*

APPENDIX G

STATE OF COLORADO
COMMENTS ON
DRAFT FINAL CHEMICAL PROCESS-RELATED ACTIVITIES NONAGENT PROCESS EQUIPMENT AND PIPING PLANNING TASK CONSOLIDATED IMPLEMENTATION DOCUMENT OCTOBER 1994

1. Page 1-3. The document states that South Plants materials will be removed only if it is safe and cost effective. What criteria will be used to determine cost effectiveness and whether removal is safe?

   Response: *See response to EPA's Comment 10.*

2. Page 1-6. The Army refers to the Final Explanation of Significant Differences (ESD) for a discussion on ARARs. Since this document is a compilation of several programs, some which were not discussed in the ESD, a discussion of ARARs is necessary in this document.

   Response: *Please refer to response to EPA's Comment 2.*

3. Page 2-2. The fact that this document does not preclude any agreement between the Army and Shell is noted in several places in this document. The state understands that Shell is not going to participate in this project. If this is the case, under what program will the Shell equipment be removed? Please explain the technical reasons for differentiation between Army equipment and any other equipment at the Arsenal.

   Response: *Please refer to response to EPA's general comment 1. Shell has the option of performing removal actions for nonagent chemical process-related piping, equipment, and tanks as part of this IRA, developing their own plan, or as part of the building demolition for the ROD. Army equipment is differentiated from Shell's since the Army is not responsible for the removal of Shell equipment.*

4. Page 2-3. Although the state agrees to the concept of a Notification Letter system for implementing this IRA, the state does not agree that the asbestos program notification letter system has been a success. The management system put into place for this project must have better coordination, both between the PMRMA personnel, and between PMRMA and the OAS.

   Response: *The text has been modified to reflect the state's concern over the coordination necessary to implement the Notification Letter.*

5. Page 2-3. The Army will send out notification letters 20 days before the scheduled start of a removal activity. At previous meetings, the Army agreed to give the state and EPA 30 days to review notification letters prior to the start of a

project. Please change the document to show that the Army will send out notification letters 30 days prior to scheduled start up.

Response: *Comment noted and corresponding text changed.*

6. Section 3. The state does not agree with using airborne concentrations to determine hazard classification. The Army plans to use organic vapor monitors and other real time equipment to assess whether equipment requires decontamination or whether it can be considered "clean." This approach is inadequate particularly for pesticides and semivolatile organics. Real time organic vapor monitors detect a very narrow range of compounds, and are only useful at concentrations which exceed several parts per million. Some of the Arsenal contaminants and process related chemicals would not be measurable on currently available real time monitoring instruments. The concentrations of vapors in the air is also dependent on temperature. The instruments could show no contaminant concentrations in the morning when it is coldest, but if readings were taken at higher temperatures at a different time of the day, or on a different day, the instrument readings could be very different.

   The Army also proposes to consider ten percent of the LEL as either clean, or as proof of decontamination. This is an inappropriate use of the explosive limit. Explosivmeters also measure airborne concentrations which are dependent on the chemical properties ambient to attain ten percent of the LEL. The percent LEL could change drastically as the day becomes warmer, and any hot work takes place. If the percent LEL must be used to determine decontamination effectiveness, zero percent of the LEL is the only acceptable limit.

   Response: *Section 4.0, Sampling and Analysis, not Section 3.0, describes the use of historical data or air monitoring to determine equipment removal and subsequent demolition techniques. Air monitoring, along with wipe samples, HAZ-CAT analysis, and Contract Laboratory Program (CLP) equivalent laboratory analytical analyses will supplement historical data and real-time air monitoring data as the contractors move from initial inspections through characterization and on to demolition and salvaging of materials. Initially, if air monitoring does confirm historical data information, then the contractor will use this information as a basis to "approach" an individual piece of equipment for removal and subsequent decontamination/demolition. Further sampling may not be performed if air sampling confirms historical information since all materials will be decontaminated before disposal or salvage.*

   Reference to the use of LEL readings for decontamination verification have been deleted.

7. Page 3-8. The fourth paragraph on this pages references "Goop". Other than stating that Goop is an incendiary mixture, there is no information on this mixture. Please supply additional information on Goop, including Goop's chemical constituents.

Response: *During pyrotechnic incendiary(PTI) operations, the ingredient goop was received in drums at Building 328. Goop was a mixture of impure magnesium dust protected from rapid oxidation by an oil-asphalt mixture. After the drums were put through the heating tunnel in Building 328, they were sent to the second floor and emptied into mixing tanks. Coarse magnesium metal and dried sodium nitrate were added followed by gasoline and a viscous phenol petroleum oil extract. An isobutylmethacrylate polymer then was added as a gasoline thickening agent. The batches were tested and accepted batches of the PTI mix filled M74 bombs. This text will be included in the document.*

8. Page 3-13. The second paragraph discussed gasoline pipelines and USTs. References are made to the UST Implementation Document. An adequate document has yet been submitted to the state. If an UST document has not been finalized at the time the Final Consolidation Implementation Document is distributed, the information referenced in this paragraph must be included in the final consolidation document.

Response: *The UST Implementation Document is in final form as of November 1994.*

9. Page 3-13, last paragraph, second sentence. This sentence is incomplete, and the state is unclear of its meaning. Please clarify.

Response: *Comment noted. Sentence was reworded to clarify its intent.*

10. Page 3-17. The Army is assuming that material in the Salvage Yard has been decontaminated. Experience with ongoing projects at the Arsenal shows this is an inappropriate assumption. If no records are found to back this assumption, the equipment should be considered contaminated and should be decontaminated.

Response: *See response to EPA's Comment 9.*

11. Page 3-24. The Army is going to "consider" equipment in the Northern Tier for removal, yet the document contains no criteria for whether or not something will be removed. The decision to remove equipment or leave it in place should not be an arbitrary one. The document should include clear criteria which will be used to determine whether equipment will be removed under this IRA, or left in place.

Response: *Please see response to EPA's comment 10.*

12. Tables 3-1 through 3-29. The equipment tables have headings for equipment and piping volumes. Are these expected removal volumes, or the total volumes for that area? The PCB columns are also confusing. Is the number for individual pieces of equipment or for volumes?

Sample result tables. Please indicate the sample locations for samples not associated with piping runs.

Response: *Tables 3-1, 3-5, 3-8, 3-14, 3-19, 3-22, and 3-27 summarize the structures identified in the South Plants by the seven characteristic areas. The heading "EQUIPMENT VOLUME" is an estimate of the volume of equipment in each structure when the equipment has been collapsed. The heading "PIPING VOLUME" is the estimated percentage of known volume that was occupied by piping.*

The "PCB TRANSFORMERS" heading indicates if any PCB transformers are associated with the corresponding structure. If there is, indicated by a "Y" for yes, the column headed by "PCB YTAG" reports the number of items identified as having greater than 50 ppm of PCBs. The column headed by PCB BTAG indicates the number of items identified as having less than 50 ppm of PCBs.

The legends for the tables will be updated to clarify the meaning of these columns.

The locations of samples not associated with pipe runs in Tables 3-13, 3-17, and 3-24 have been included in the text and are presented in the included Table 2. The location column is a description of samples taken that were not associated with piperuns. The samples were "hot" spot locations such as valves located at low spots, a paint booth, and open pipe lcoated in a building. Table 3-13, the samples 471 (10-14) are listed. These samples were trip blanks and should not have been included and therefore will be deleted. The tables were updated by inserting a column headed with "LOCATION" between "PIPE RUN" and "HISTORICAL DESCRIPTION."

13. Page 4-1. The dependence on historical information concerns the state. Historical records have often been incomplete and at times even incorrect. If historical information cannot be verified, the contamination status of the equipment must be considered unknown. The statement that it may not be possible to determine hazard categorization of equipment that appears to be in good shape is incorrect. Contamination is not always visible, and the best way to determine whether hazardous constituents are present on a solid surface is to have wipe samples analyzed.

    Response: *Please refer to response to EPA's Comment 18.*

14. Page 4-2. Figure 4-1 indicates that if the interior looks clean sampling is not necessary. Again, contamination is not always visible, and the way the interior looks is not an appropriate criteria for contamination determination.

    Response: *Please refer to response to CDPHE's Comment 6.*

15. Page 5-8, third paragraph. Again, the state objects to using 10% of the LEL to determine whether decontamination is complete. If LEL is to be used the only appropriate level is 0%.

    Response: See response to CDPHE's comment 6.

16. Page 5-9. The sentence "If decontamination to render the tank fit for recycling is not practicable, it will be disposed of as debris." Instead of debris the sentence should state "it will be disposed of as hazardous waste." How will the Army determine whether the decon is practicable?

Response: *Please see response to EPA's comment 25.*

17. Page 5-10, last bullet. See Comment 16.

Response: *Please see response to EPA's comment 25.*

18. Page 5-12, last paragraph. The Army again is using air sampling to determine hazard classification. The use of atmospheric monitoring is not specific enough and it cannot measure nonvolatile chemical nor is it accurate enough at low concentrations. Please change this criteria.

Response: *The use of Best Demonstrated Available Technology for material decontamination, in connection with using the LDR clean debris surface standard for hazardous debris, is consistent with regulatory requirements for determining hazardous/nonhazardous states of the material. Use of air monitoring procedures for further decontamination verification will be performed by the Army in addition to the regulatory requirements as a last effort to verify complete decontamination.*

19. Page 6-7. Even though no one has been hurt at the Arsenal while torch cutting piping, this does not mean we can just disregard the hazard associated with using open flames. Before any pipe is to be cut by torches, the Army must be certain that the use of a torch on the pipe poses no danger. Again, LELs can change while work is ongoing and constant vigilance must be practiced for areas which indicate concentrations of chemicals above background levels.

Response: *Please refer to response to EPA's Comment 28.*

20. Page 6-13. The White Phosphorus Area is not recommended for inclusion in this removal project. If these materials are not to be included in this project, why are the tables and figures regarding this area included in this document? What project will include the removal of the materials in the White Phosphorus Area?

Response: *Removal of all piping, equipment, and tanks in the White Phosphorus Area will be accomplished as part of the agent chemical process-related activities IRA.*

21. Page 6-14. "It is believed that Shell personnel flushed large amounts of this piping..." Again, the belief that piping was flushed is not adequate for a waste or hazard determination. If documentation is not available, this piping must be properly characterized prior to equipment removal. The tables are included to illustrate the minimal amount of nonagent chemical process-related equipment remaining in the White Phosphorus Area that can be removed under the plans set

forth in the Consolidated Implementation Document. Please see response to EPA's comment 7.

Response: *The sentence "If no records are found to confirm that the piping was adequately flushed with water, sampling of the piping will be performed to properly characterize before removal." was added to the paragraph.*

22. Page 7-2. In the logic diagram the available answers for the block which asks "is the material a solid waste as per 40 CFR 261.2" are solid and liquid. The determination of whether a material is a solid waste as per 261.2 is not dependent on whether it is a solid or liquid. A liquid waste can be a solid waste. Please clarify this table.

Response: *The block text was changed to read "Is the material defined as per 40 CFR 261.2 a solid waste?"*

The decision "solid" was changed to "yes." If the decision is "yes", the solid waste is further defined by its physical state to determine the corresponding disposal action.

The decision "liquid" was changed to "no." If the decision is "no", no regulations are applicable.

23. Page 7-3, first full paragraph. According to Colorado's Solid Waste Regulations, there are several categories of "special wastes." These include construction waste, industrial waste, and asbestos contaminated waste. When determining an appropriate landfill, these special categories must be considered.

Response: *This comment will be taken into consideration when determining land disposal options.*

24. Page 7-5. The RCRA permitted Subtitle C facility must meet the CERCLA "off-site policy." What facilities will be used to dispose of hazardous waste?

Response: *The RCRA-permitted Subtitle C facility that will be used to landfill hazardous waste is the Highway 36 facility. If the facility changes, OAS will be notified.*

25. Example notification letter. The state and EPA agreed to 30 days from the time of notification until the demolition work actually begins. Please change this sample letter to reflect 30 days.

If a waste disposal facility for the project is known, please include this information in the notification letter.

Response: *The text has changed to indicate a 30-day review period of the Notification Letter. The specific disposal facilities identified for the material and waste generated that is not disposed of through DRMO and CWHA will be specifically identified.*